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AN EXAMINATION OF AN
ALTERNATIVE WIC FOOD COST
INFLATION INDEX

FINAL REPORT TO CONGRESS

REPORT ON A WIC INFLATION INDEX

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A WIC INFLATION INDEX

I. INTRODUCTION

The Food and Nutrition Service (FNS) attempted to develop a new inflation index to consider for use in the funding formula used to allocate food funds to States in the Special Supplemental Program for Women, Infants, and Children, commonly known as the WIC Program. In 1990, in response to a large and unanticipated rise in food costs, FNS began developing the index with the goal to better project inflationary trends in the WIC Program. Later that year, in the language accompanying the FY 1991 WIC appropriation, Congress directed FNS to "develop an inflation index for use in adjusting the WIC allocations based upon foods that are prescribed for use in the WIC food package." The index was developed by USDA's Economic Research Service (ERS) with assistance from the Office of Analysis and Evaluation, FNS and the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor. The index was developed to determine if it could eventually replace the Thrifty Food Plan Index in the WIC funding formula used to allocate WIC grants to states and potentially to develop WIC budget and participation estimates and to monitor WIC food costs.

This paper presents the index model, discusses issues related to its use, and includes recommendations regarding the use of the WIC index. The paper covers the period from October 1, 1989 to September 30, 1991, Fiscal Years 1990 and 1991. An earlier draft of this report received helpful comments from State and local WIC agencies, economists, advocates and others members of the WIC community. FNS requested comments in order to refine and strengthen the index prior to making a decision on whether or not to adopt it for use in the funding formula. FNS reviewed the public comments and, where appropriate, used them to prepare this final report.

Because WIC is a discretionary grant program, the number of women, infants, and children that can be served each year depends upon the annual appropriation and the cost of WIC foods. WIC food packages are comprised of eight foods that are intended to supplement participants' diets. The composition and quantity of food provided in the package depends upon the category of participant and their nutritional risk status. Thus, the program's average per participant food cost will vary each year depending upon both the retail prices of WIC food items and the composition of the program's participant caseload. Because of this, forecasting future costs of the WIC market basket is more complex than forecasting other fixed market baskets such as the Thrifty Food Plan.

A general description of the WIC Program is provided for readers who are unfamiliar with the program. Readers familiar with the program may choose to disregard this section and proceed to

Section III, "WIC Budget Formulation and State Grant Allocation."
Additionally, Appendix A is provided for readers with more
specialized knowledge of econometrics and forecasting. It
contains the econometric models, parameter estimates and summary
statistics for the equations used in the forecasting components
of the WIC index.

II. DESCRIPTION OF THE WIC PROGRAM

The Special Supplemental Program for Women, Infants, and
Children, commonly known as the WIC Program, is a grant program
administered by the Food and Nutrition Service (FNS) of the U.S.
Department of Agriculture. In 1969, the White House Conference
on Food, Nutrition and Health recommended that special attention
be given to the nutritional needs of low-income pregnant women
and preschool children. As a result, legislation authorizing WIC
passed in 1972 (P.L. 92-433). The Child Nutrition and WIC
Reauthorization Act of 1989, P.L. 101-147, authorized the program
through September 1994.

WIC has expanded considerably since its inception. Funding
increased from $10 million in 1974 to a Fiscal Year 1992
appropriation of $2.6 billion. Average monthly participation
increased from about 88,000 women, infants, and children in
Fiscal Year 1974 to almost 4.9 million in Fiscal Year 1991.

WIC's goal is to improve the health of program participants by
providing supplemental foods, nutrition education and counseling,
and health care referrals. The benefits provided by the WIC
Program include:

o   **Supplemental Food.** WIC participants receive food, food
        vouchers, or food checks to supplement their diets and
        provide nutrients generally lacking in the diets of low
        income individuals: iron, calcium, protein, and Vitamins A
        and C. These nutrients are particularly critical during
        periods of increased nutritional requirements: pregnancy,
        lactation and early childhood. The food items provided
        include milk, fruit/vegetable juices, infant formula,
        cheese, eggs, cereals, dried peas and beans, and peanut
        butter. FNS established the maximum prescribable amount of
        each food by regulation.

o   **Nutrition Education and Counseling.** WIC participants
        receive nutrition education and counseling to assist them in
        using WIC foods and choosing other foods as part of a total
        balanced diet. Nutrition education helps participants
        develop sound dietary practices which can be maintained
        after participation in WIC ends. Participants are counseled
        by dieticians and nutrition professionals. WIC regulations
        require that, at a minimum, the equivalent of one-sixth of
        administrative funds expended by the State agency be spent
        for nutrition education.

o   **Referral to Health Care Services.** Each WIC agency serves as
    an adjunct to good health care and participants are
    encouraged to take advantage of health care services that
    are available to them. WIC staff provide referrals and
    counsel women to receive early and adequate prenatal health
    care services. Infants and children receive referrals to
    health care services such as well baby care and
    immunizations. In addition to health care services, WIC
    staff inform participants about and refer them to a range of
    services and benefit programs such as food stamps, AFDC,
    Medicaid, drug and alcohol counseling, etc.

The WIC Program functions administratively at three levels:
Federal, State, and local. FNS, through its seven regional
offices, allocates cash grants to 86 designated WIC State
agencies for program administration and operations. FNS
publishes regulations governing WIC and FNS Regional Office staff
monitor State agencies for compliance with the regulations. WIC
State agencies establish, monitor, and report local WIC agency
activities to FNS. Local WIC agencies recruit participants and
deliver program services.

Unlike the Food Stamp Program, WIC is not an entitlement program
through which all eligible individuals can receive benefits. It
is a discretionary program funded at a specific grant level on an
annual basis. FNS allocates WIC food and administrative grants
to State agencies using an established funding formula which is
part of WIC program regulations. State agencies, in turn,
allocate food and administrative funds to participating local WIC
agencies within their jurisdiction. There are approximately
1,750 local WIC agencies with over 8,200 service delivery sites.
Local agencies are often city or county health departments, but
also may be any of a variety of public or nonprofit health or
human service organizations such as hospitals, maternal and child
health groups, or community action agencies. Local WIC agencies
use the funds they receive to provide food packages to WIC
participants and to cover administrative costs, including the
costs of certifying applicants for eligibility, providing
nutrition education and counselling, and establishing referrals
for the other needed health and social services.

To qualify for WIC benefits, an applicant must meet categorical,
income, and nutritional risk eligibility requirements.
Categorically eligible individuals include: pregnant,
breastfeeding, and postpartum women, infants, and children up to
5 years old. The income limit for eligibility is set by each
State agency, but must meet Federal requirements not to exceed
185 percent nor be less than 100 percent of the OMB U.S. Poverty
Income Guideline for each family size. Using this standard, in
1992, a person from a family of four with total annual income
equivalent to $25,808 would be income-eligible for WIC. Some
States give local agencies discretion to set lower income

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eligibility criteria but they must be consistent with income limits for free/reduced price health care. Finally, WIC applicants who meet the categorical and income requirements are certified for Program participation only if they also are determined by a competent professional authority to be at nutritional risk. This determination is made on the basis of established medical, clinical, or dietary risk criteria, set by each State.

Because WIC is not an entitlement program, local agency caseloads depend upon the amount of funding available to the State. When local WIC agencies reach maximum participation within available funding, they use a system of priorities to allocate caseload slots as they become available. There are seven priority levels for WIC, based on the applicant's categorical status and type of nutritional risk condition. Eligible applicants with a medically-based nutritional risk receive priority over individuals' whose risk is a function of inadequate dietary patterns. Within this broad framework, WIC gives priority first to pregnant and breastfeeding women, and infants, then to children, and finally to non-breastfeeding postpartum women.

III. WIC BUDGET FORMULATION AND STATE GRANT ALLOCATIONS

Food price inflation projections are important to FNS' budget and participation estimates. FNS develops annual national budget and participation estimates for the WIC Program and allocates WIC funds to the 86 state agencies. Because WIC is a discretionary program with a fixed grant level, annual participation projections depend upon the appropriation and the estimated cost of the WIC benefit package. FNS uses various economic indices to make these projections.

To determine the amount of each WIC state agency's grant, FNS uses an established funding formula. The funding formula for food benefits consists of three components --stability, targeting, and growth. The stability component, determined first, maintains states' prior year operating levels by adjusting their prior year's food benefit grants for inflation. Implicit to the stability concept is the assumption that given an adequate appropriation increase for inflation, States will be able to serve, at a minimum, the same number of participants as the prior year. Funds remaining after calculating the stability grant levels are divided equally to the growth and targeting components. Growth funds provide specific state agencies more funds when their proportion of the total stability grants is less than their proportion of the total estimated eligible population. Targeting funds provide more funds to state agencies that have demonstrated the capability to reach the portion of their eligible population who are at the highest nutritional risk.

Because of the fixed grant level, it is important that FNS'
participation and cost projections be as accurate as possible.
Over- and under-estimates can affect the way WIC state agencies'
manage their caseloads since States use the initial FNS forecasts
as the basis for planning their caseloads for the coming year.
Under-estimating inflation can result in caseload expansion which
cannot be supported by existing funds. This occurred in FY 1990
when because of unanticipated food cost inflation, WIC's average
monthly caseload was 200,000 less than projected for the year.
Over-estimates can result in unused capacity within the grant.
At the FY 1991 appropriation level, an over-estimate of one
percentage point in the inflation rate could have resulted in
about 45,000 fewer persons being served per month. Over-
estimating WIC food costs can also result in allocating more
stability funds to states with relatively large existing
caseloads and less growth funds to states with relatively large
unmet needs. Thus, caseload expansion would not be properly
targeted to states with the highest priority needs.

Inflation Projections in the WIC Program

Since 1986, FNS has used the Thrifty Food Plan (TFP) Cost Index
to project WIC food cost inflation and to compute the inflation
factor in the funding formula. The TFP is a low-cost food plan
designed to meet the nutritional needs of a family of four,
including two children ages 6-8 and 9-11. It is designed to
provide an economical, nutritionally balanced diet based on
consumption from 31 food groups and is composed of a much larger
quantity and variety of foods than the WIC market basket. In
contrast, the WIC food package supplements and complements the
current diet to meet targeted nutritional needs. The WIC market
basket has eight foods and differs substantially from the TFP
basket. For example, in FY 1990, accounting for the effects of
rebates, infant formula accounted for 25 percent of the average
WIC food package cost and milk, cheese, and eggs together made up
another 43 percent. The TFP basket contains no infant formula
and together milk, cheese, and eggs comprise about 13.9 percent
of TFP costs. Table I shows the relative cost shares of the WIC
foods for both the WIC and TFP market baskets. The WIC shares
are the net shares after adjusting for the effects of infant
formula rebates, since rebates reduce the cost of infant formula
to the WIC Program.

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TABLE I

WIC FOODS ITEMS PROPORTION OF COST SHARES
WIC VS TFP MARKET BASKET
(Net of Formula Rebates)
Fiscal Year 1990

FOOD ITEM	WIC COST SHARE	TFP COST SHARE
MILK	25.71%	9.96
CHEESE	12.59%	1.90%
INFANT FORMULA	25.36%	- 0 -
CEREAL	12.90%	4.95%
JUICE	17.36%	3.50%
PEANUT BUTTER	1.33%	2.11%
DRIED BEANS/PEAS	0.59%	1.82%
EGGS	4.17%	1.36%
% TOTAL BASKET	100%	25.6%

Historical Relationship Between the TFP and WIC Food Package Costs

Historically, TFP cost inflation has not tracked actual WIC food cost inflation. Because of the differences in the composition of the TFP and the WIC food package, it is unlikely that the annual TFP cost forecasts would be an adequate indicator of future WIC food costs. Changes in the costs of the two market baskets can vary greatly on a month-to-month or year-to-year basis. FNS reports annual WIC food costs using an average monthly cost per participant for the year. The annual average, however, does not convey how WIC food cost can fluctuate from month-to-month due to changes in prices or to the participant caseload mix. The average TFP cost also fluctuates monthly. Table II shows the extent to which the cost of both the TFP and WIC food package can fluctuate from one month to another. Note that some of the fluctuations were due to deliberate actions taken in 1990 by WIC program managers to cushion the effect of rising food prices.

Given the differences in the nature of the two indicators themselves, the cost fluctuations are to be expected. The cost of the TFP is determined solely by the average shelf prices of

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the individual commodities comprising the TFP market basket. However, the average WIC food package cost is influenced by factors other than the shelf price of the individual WIC commodities. Individual State WIC agencies can control the cost of the WIC package in their states by limiting or restricting the types and forms of food which can be purchased with WIC vouchers. These actions are referred to as "administrative adjustments" to the WIC food package. In addition, State WIC agencies may implement cost containment measures, such as rebate systems to better manage expenditures for costly WIC food items. Infant formula rebates have been a highly successful initiative on the part of State WIC agencies to lower the cost of infant formula purchased through the WIC program. Vendor management activities at the State level can also affect the average WIC food package cost. States may limit the number and type of vendors who may participate as authorized WIC retailers. The practices and effectiveness of State vendor management activities can affect a State's average WIC food package costs. States which more aggressively monitor authorized vendors to prevent fraud and abuse may realize lower food package costs than States with more relaxed practices. At the local agency level, WIC food package costs can be influenced by actions which determine the amounts of each WIC food prescribed to individual WIC participants. Tailoring refers to the practice of determining how much food will be prescribed to individual participants based upon their specific nutritional risks conditions. For example, if the dietary assessment indicates that a participant's diet may be high in fat, the WIC nutritionist may prescribe lower fat versions or smaller quantities of milk and cheese, affecting the cost of the food package that a participant purchases with WIC vouchers. Even individual participants influence the cost of the WIC food package in the degree of choice that they are given to select the type and quantity of foods to purchase with their WIC vouchers.

Table III depicts the fluctuations in the annual average costs of the TFP and WIC food package. As Table III shows, in some years the rates of change in the costs of the two market baskets are within one percentage point, while in other years the difference is much greater. Exhibit 1 illustrates the disparity in the year-to-year changes in TFP and WIC average food package costs. The two baskets vary in both the direction and magnitude of the price movements.

TABLE II
MONTHLY WIC AND THRIFTY FOOD PLAN COST CHANGES
Fiscal Year 1990

MONTH	AVERAGE WIC FOOD PACKAGE COST* ($)	% CHANGE	TFP COST ($)	% CHANGE
FY 1989 Annual Average	30.14		318.44	
October	29.75		325.10	
November	29.89	+ 0.47	326.70	+ 0.49
December	30.58	+ 2.31	328.20	+ 0.46
January	30.88	+ 0.98	341.10	+ 3.93
February	31.35	+ 1.52	344.20	+ 0.91
March	31.01	− 1.09	343.50	− 0.21
April	30.78	− 0.75	341.00	− 0.73
May	29.94	− 2.73	340.00	− 0.24
June	29.09	− 2.84	342.20	+ 0.59
July	29.36	+ 0.93	345.10	+ 0.85
August	29.41	+ 0.17	345.60	+ 0.14
September	30.28	+ 2.96	345.20	− 0.12
FY 1990 Annual Average	30.20	+0.20	339.01	+6.46

NOTE: The average WIC food package cost is derived by dividing the program's total food expenditures for the month by the average monthly participation. The result is then divided by 12 to yield an average monthly food package cost per participant for the fiscal year. Prior to 1988, WIC's average food package cost was equivalent to the average retail or shelf price of the food package. From 1988 on, WIC's average food package cost is a net cost after accounting for the effect of infant formula rebates and other cost containment.

## TABLE III
ANNUAL WIC AND THRIFTY FOOD PLAN COST INFLATION

FISCAL YEAR	AVERAGE WIC FOOD PACKAGE COST*	% INFLATION WIC FOOD COST	TFP INFLATION
1981	$ 27.84	+ 9.48	+ 10.12
1982	28.83	+ 3.56	+ 3.63
1983	29.62	+ 2.74	+ 0.82
1984	30.58	+ 3.24	+ 4.24
1985	31.69	+ 3.63	+ 1.54
1986	31.82	+ 0.41	+ 1.71
1987	32.68	+ 2.70	+ 4.64
1988	33.28	+ 1.84	+ 3.84
1989	30.14	- 9.44	+ 7.66
1990	30.20	+ 0.20	+ 6.46

NOTE: The average WIC food package cost is derived by dividing the program's total annual food expenditures by the average monthly participation. The result is then divided by 12 to yield an average monthly food package cost per participant for the fiscal year. Prior to 1988, WIC's average food package cost was equivalent to the average retail or shelf price of the food package. From 1988 on, WIC's average food package cost is a net cost after accounting for the effect of infant formula rebates and other cost containment.

Fluctuations in the price of an individual WIC food can significantly affect the overall cost of the WIC food package. However, because the TFP market basket consists of over 200 food items, fluctuations in the price of an individual TFP item will generally have minimal effect on its overall cost. Thus, unless all food prices change at the same rate, there is little reason to expect that WIC and TFP costs should move together. The differences are particularly obvious at the retail or shelf price level for WIC food items. For example, in Fiscal Year 1990, retail prices for orange juice, milk and cheese escalated due to unforeseeable weather and market conditions. In addition, the wholesale price of infant formula rose over 13 percent. These price increases had a significant impact on the shelf price of WIC food packages. At the time, FNS estimated that the shelf price of the average WIC food package rose from $35.82 in FY 1989 to $39.54 in FY 1990. The average monthly TFP cost was $318.44 in FY 1989 and $339.01 in FY 1990. The shelf price of the

Exhibit 1
INDEX OF WIC AND TFP COSTS 1980 – 1990
(1980 as base period)

Index

WIC

TFP
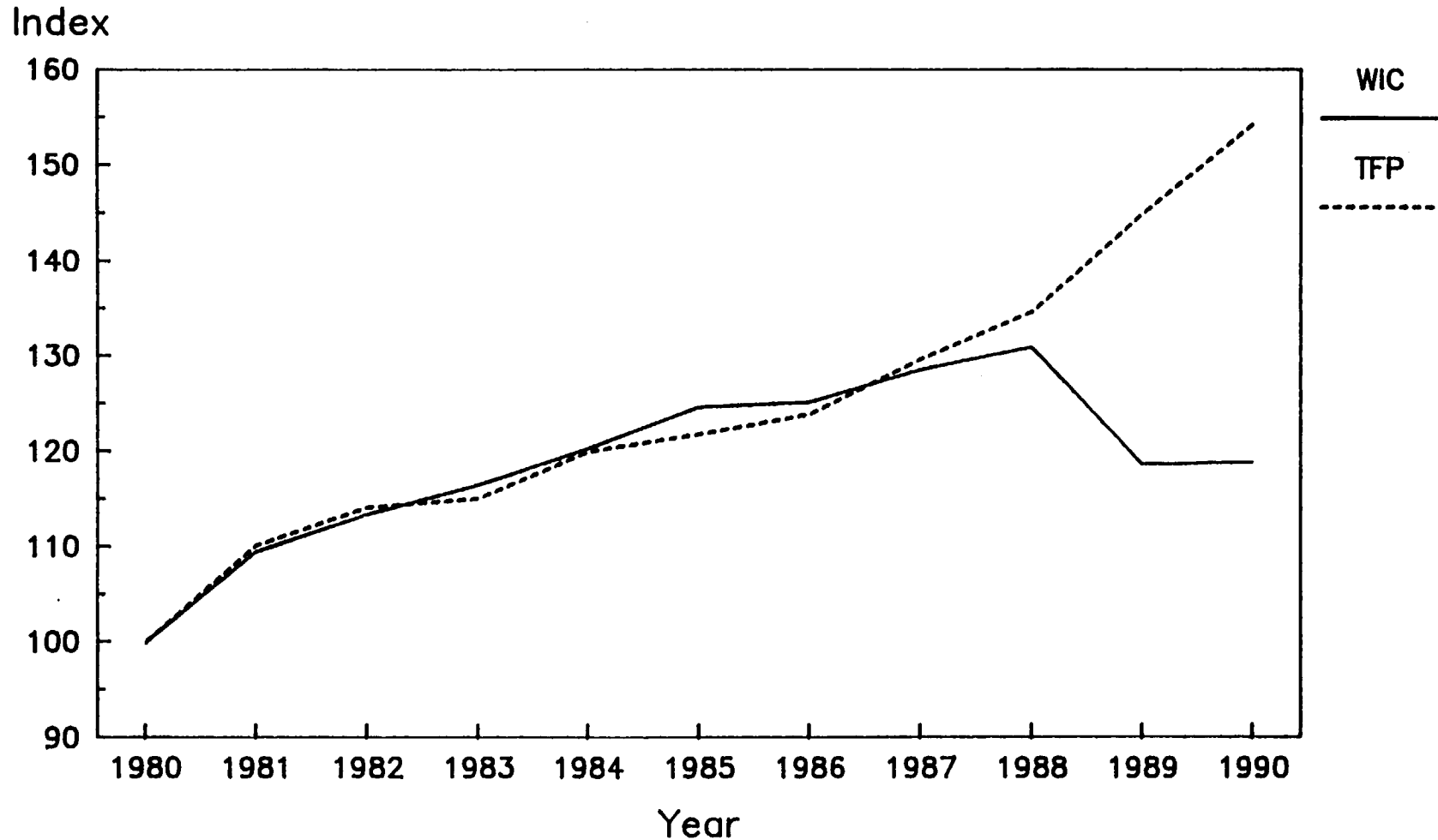
WIC food costs from 1988 on are net food package
cost after adjusting for effects of infant
formula rebates or other cost containment.

average WIC food package rose over ten percent in 1990 compared
to the six and one-half percent increase in the TFP cost. WIC's
FY 1990 average per person food cost did not reflect the 10
percent shelf price inflation because of cost containment
measures, such as infant formula rebates, implemented by the WIC
state agencies.

In Table IV, changes in actual TFP and WIC food package costs
have been indexed to a base year, 1980, to compare the cumulative
effects of price changes. The results, depicted in Exhibit 1,
show that until 1988, actual WIC and TFP food costs cumulatively
inflated at about the same rate. In 1988, infant formula rebates
began and, as a result, sharply curtailed the rise in WIC food
costs. From 1980 to 1990, the cost of the TFP increased over 50
percent while WIC food costs increased less than 20 percent, due
to the effect of infant formula rebates initiated in 1988.
Without infant formula rebates, WIC costs would show the same
sharp increases in later years as experienced by the TFP. Since
Fiscal Year 1988, by using TFP inflation projections, FNS has
actually overestimated the effects of inflation in the funding
formula and thereby over-compensated the States in their
stability grant allocations by a small amount.

TABLE IV
INDEX OF WIC FOOD AND TFP COSTS SINCE 1980
(1980 as base period)

FISCAL YEAR	WIC FOOD PACKAGE COST	TFP COST
1980	100.00	100.00
1981	109.47	110.12
1982	113.37	114.11
1983	116.48	115.05
1984	120.25	119.92
1985	124.62	121.77
1986	125.13	123.85
1987	128.51	129.60
1988	130.87	134.58
1989	118.52	144.89
1990	118.76	154.25

TFP Projections vs. Actual WIC Food Cost

As discussed above and shown in the tables, on a monthly and
yearly basis, there can be considerable deviation between TFP and
WIC food package cost inflation. FNS uses a combination of
actual and projected TFP costs to calculate the inflation
adjustment in the state grant allocation funding formula. Semi-
annually, the Office of Management and Budget (OMB) issues
projections of the future performance of various economic
indicators for use in federal budget planning and estimates.
Projections of the TFP cost for the last of month of each quarter
are provided for the next five fiscal years. Starting with
Fiscal Year 1986, FNS began to use three quarters of actual TFP
costs and five quarters of projected TFP costs to compute a
simple annual average inflation rate in the funding allocation
formula for the upcoming fiscal year. FNS first estimates the
current year's average TFP cost using December, March, and July
actual TFP costs along with September's projected cost. Because
the actual September cost is not available when the State grants
are calculated, FNS uses a projected September cost. Next the
average TFP cost in the upcoming year is derived using TFP
projections for the same four months. The projected average TFP
cost for the upcoming year is then divided by the current year's
estimated average TFP cost. This yields the inflation adjustment
factor to be used in the funding formula. However, TFP forecasts
generally have not tracked well with the actual movement of TFP
or WIC food costs. Table V below compares past TFP projections
to actual TFP and WIC food cost movement since 1986.

TABLE V
COMPARISON OF PROJECTED TFP INFLATION
TO ACTUAL WIC FOOD COST CHANGES

FISCAL YEAR	PROJECTED TFP INFLATION	ACTUAL WIC FOOD COST CHANGE	ABSOLUTE DIFFERENCE PROJECTED TFP VS ACTUAL WIC
1986	2.75%	+ 0.41%	+ 2.34
1987	3.20%	+ 2.70%	+ 0.50
1988	3.93%	+ 1.84%	+ 2.09
1989	4.11%	- 9.44%	+ 13.55
1990	4.09%	+ 0.20%	+ 3.89
5 Year Total	19.43	- 4.71	+ 24.14

The Impact of Price Increases in 1990

Events occurring in 1990 prompted FNS to renew earlier work to develop a WIC specific inflation index. In Fiscal Year 1990, FNS estimates that the retail or shelf price of the average WIC food package rose by about ten percent over the previous year. During the second quarter of the year, it became evident that WIC food costs were rapidly rising beyond the inflation rate used to calculate the states' stability grants. In October 1989, the Bureau of Labor Statistics reported that the average retail price of a half-gallon of whole milk was $1.29. Three months later in January 1990, that price had increased by ten percent to $1.42. During the same period, the price of a dozen eggs rose nearly 20 percent. In January 1990, freezing weather destroyed the Florida citrus crop and orange juice prices began to rise. The price of 16 ounces of frozen orange juice concentrate, a popular WIC food item, began to rise steadily from $1.81 in January 1990 and peaked at $2.29 in July, an increase of over 25 percent. Milk prices rose over 11 percent from 1989 to 1990; cheese prices rose almost 13 percent, and orange juice by almost 7 percent.

Because of the WIC reporting cycle, the magnitude of the price increases in Fiscal Year 1990 did not become evident until March, the end of the second quarter. Because WIC state agencies need time to collect and submit participation and cost data, there is a three to five month lag in reporting WIC monthly food package costs to FNS. In March 1990, participation in WIC reached the highest level for the year, 4.63 million women, infants, and children. During the same period, the average cost of the WIC

food package rose steadily each month. The average food package cost started in October 1989 at $29.75 and by February was $31.35, a 5.37 percent increase (12.9 percent on an annual basis). The average monthly cost of the TFP during the same period was $333.06, 4.59 percent higher than the FY 1989 average.

OMB projected a 1990 TFP inflation rate for the entire fiscal year of 4.09 percent and this was the rate FNS used in the funding formula to allocate the state WIC food grants. WIC state agencies used the projected level of inflation along with their estimates of infant formula rebate savings to allocate caseload levels to their local WIC agencies. Because of the success with infant formula cost containment, states with infant formula rebate systems in place experienced a significant decrease in the average WIC food package cost in 1989. WIC state agencies expected this trend to continue in 1990 and allocated local agency caseloads based upon this expectation. However, increases in the retail prices of milk, cheese, and orange juice in 1990 countered expected additional savings in infant formula cost.

States responded to the unanticipated cost increases in a number of ways. Some states used state appropriated funds to supplement their federal WIC grants or converted administrative funds to cover increased food costs. Many WIC state agencies, however, did not have such contingency funds and they began to take action to reduce costs. Within the context of permissible nutritional tailoring, some states restricted the types and package sizes of foods which could be purchased with WIC vouchers. For example, they restricted purchases to store brands rather than more expensive national brands of WIC foods or lower cost dried beans/peas were prescribed instead of peanut butter. However, these actions were not always enough and, in addition to other measures, some states were forced to impose moratoria on enrolling certain categories of participants.

Ironically, because of infant formula rebates and the administrative actions taken by the states, the average food package cost in FY 1990 of $30.20 was only six cents, less than two-tenths of one percent, higher than the prior year's average cost of $30.14. The 1990 average WIC food package cost certainly did not reflect WIC inflation at the shelf price level. But it also did not meet FNS' projected average food cost for the fiscal year. Using the forecasted TFP and infant formula rebate estimates, FNS projected that, nationally, WIC food package costs in 1990 would average $28.80, decreasing $1.40 from the 1989 level.

The 1990 experience led FNS to renew efforts to improve the accuracy of its budget projections by developing an inflation index specific to the WIC foods. It should be noted, however, that the weather and market conditions which precipitated the 1990 price increases were unforeseeable and it is unlikely that

they would have been captured by any economic forecast. Even if a WIC specific index had been available to allocate FY 1990 state food grants, it would not have projected the destruction of the Florida citrus crop or the mid-western fodder crops due to weather conditions.

Infant Formula Costs

Historically, infant formula comprised the largest proportion of WIC food expenditures. Prior to the advent of infant formula rebate systems, formula expenditures accounted for about 40% of the WIC food budget. For a number of years, the price of infant formula increased at a far greater rate than the TFP inflation rate used to estimate WIC budget and participation projections. Table VI shows the annual increase in the wholesale price of infant formula compared to the increase in the TFP while Exhibit 2 demonstrates the magnitude of infant formula price inflation as compared to TFP inflation.

TABLE VI
COMPARISON OF INFANT FORMULA PRICE[1] INFLATION
VS. THRIFTY FOOD PLAN INFLATION

FISCAL YEAR	% FORMULA PRICE INFLATION	FORMULA $ INDEXED	% TFP INFLATION	TFP INDEXED
1980		100.0		100.0
1981	19.1	119.1	10.1	110.1
1982	8.7	129.5	3.6	114.1
1983	6.3	137.7	0.8	115.0
1984	9.7	150.1	4.2	119.9
1985	8.0	163.1	1.5	121.8
1986	6.0	172.8	1.7	123.8
1987	11.5	192.7	4.6	129.6
1988	6.9	206.0	3.8	134.6
1989	8.3	223.2	7.7	144.9
1990	13.2	252.7	6.5	154.3

The arrival of infant formula rebates in the WIC Program has, to some extent, buffered the effects of formula prices increases in recent years. Rebates have a tremendous effect on the cost of the infant food package, reducing it from the costliest to the least expensive food package. Since infants comprise about one-third of the participant caseload, rebates also have a significant impact on WIC's average food package cost. For example, while infant formula accounts for over 40 percent of the shelf or retail price of the average WIC basket in FY 1990, only 25 percent of WIC food expenditures was for formula after accounting for the effect of rebates. In FY 1989, the average food package cost actually decreased by over nine percent from the 1988 average due to the effects of infant formula rebates. Rebates cushioned the effect of the dramatic increase in the shelf price of key WIC food items in FY 1990.
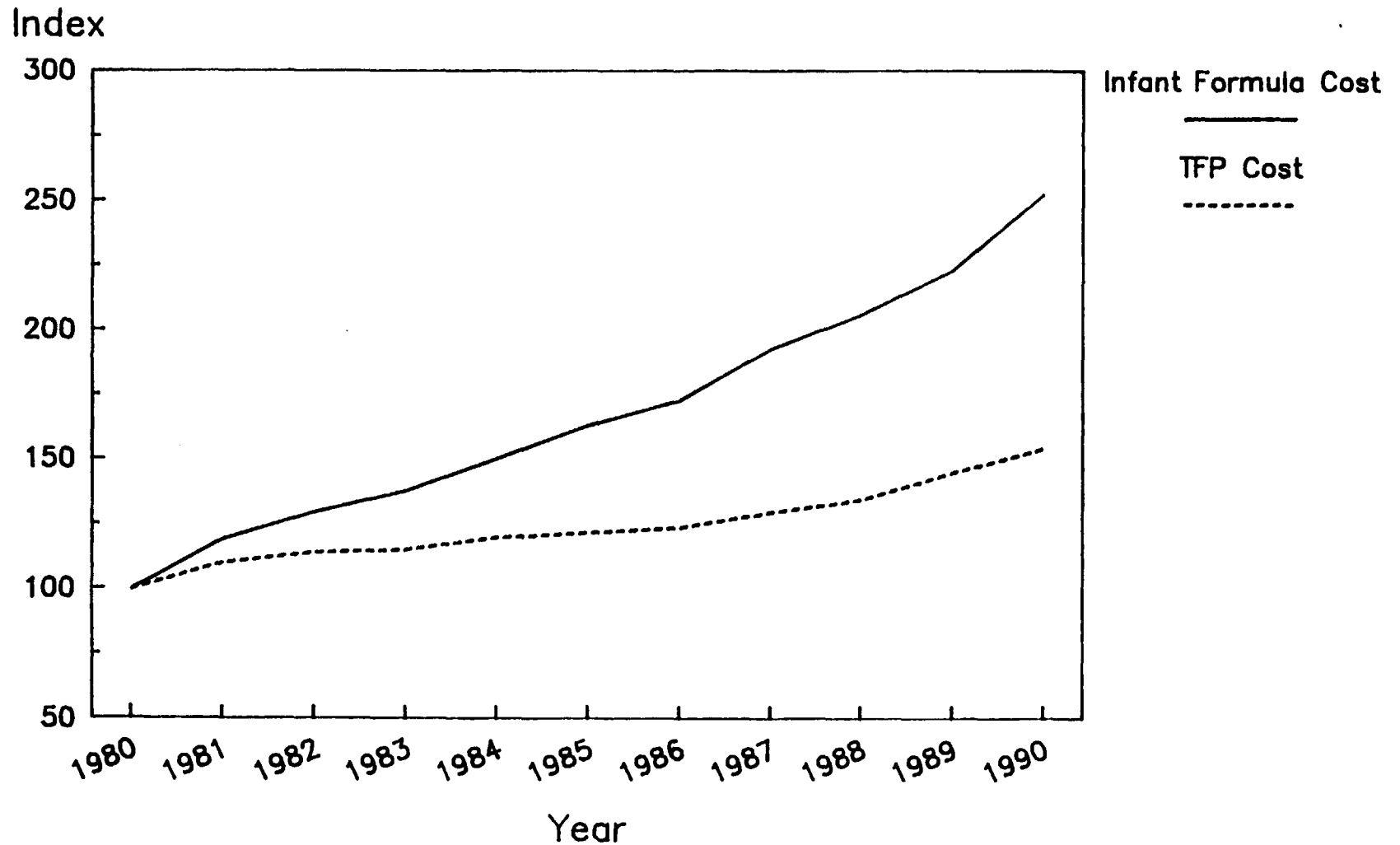
Rebate contracts generally are based on the wholesale price of infant formula and include inflationary pass-through clauses to

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[1]Wholesale truckload price paid by most large retail chain stores.

Exhibit 2
INDEX OF INFANT FORMULA AND TFP COSTS
(1980 as base period)

Infant formula cost index is based on wholesale,
truckload prices.

protect states from wholesale price increases. The point is raised that because formula rebate contracts generally have inflation adjustment clauses, it is not necessary to accurately forecast infant formula prices at the retail level. Therefore, it is argued, infant formula should not be included as part of the index. Currently, all state rebate contracts include inflationary adjustment clauses by which their rebates increase whenever the wholesale price increases. The states may receive a cent-for-cent inflationary increase in their rebate or they may receive only a percentage of the wholesale increase, depending on the contractual agreement. If all states received a cent-for-cent increase, it would not be necessary to forecast infant formula prices assuming formula retail price change in the same direction and extent of wholesale prices. However, not all States receive cent-for-cent rebate increases whenever wholesale prices increase. In addition, if formula retail prices increase at a rate that is greater than wholesale price increases and increase projected for the average WIC food package, States would be at risk of higher than anticipated formula costs. For these reasons, FNS elected to include infant formula pricing as a component of the WIC index model. The model, described in the next section, is designed to forecast changes in the retail price of formula while accounting for the effect of rebates. FNS will provide ERS with data to adjust the index model to capture the effects of infant formula rebates.

FNS' national budget and participation estimates need to capture the actual cost of infant formula to the WIC Program. The actual cost of WIC formula is equivalent to the national weighted average retail price of a can of formula minus the national weighted average per can rebate. Due to the lack of current information on formula retail prices, estimates are made using the assumption that wholesale and retail prices move together. Table VII below shows the estimated net cost per can of rebated formula to the program since the inception of rebates in FY 1988. In Fiscal Year 1988, rebates totalled $33 million and FNS estimates that rebates were received for formula prescribed to less than 10 percent of WIC infants. In Fiscal Years 1989, 1990, and 1991, WIC received rebates totalling $293 million, $509 million, and $656 million, respectively. As more states entered into rebate contracts, FNS estimates that by FY 1991, over 85 percent of WIC infants received formula for which rebates were paid. As shown in the table, while rebates have offset a proportion of infant formula wholesale price increases, WIC's net cost for formula in 1990 and 1991 increased at a greater rate than the TFP or other food plan costs.

TABLE VII
ESTIMATED NET PER CAN COST OF REBATED FORMULA IN THE WIC PROGRAM
Fiscal Years 1987 to 1991

FISCAL YEAR	AVERAGE WHOLESALE PRICE $	ESTIMATED AVERAGE PER CAN REBATE[2] $	NET COST PER CAN OF REBATED FORMULA	CHANGE IN NET COST FROM PRIOR YEAR	CHANGE IN TFP COST FROM PRIOR YEAR
1987	$ 1.33	$ .00	$ 1.33	+ 12%	5%
1988[3]	1.43	.80	.63	− 53%	4%
1989	1.55	1.22	.33	− 48%	8%
1990	1.75	1.28	.47	+ 42%	6%
1991	1.95	1.39	.56	+ 19%	4%

Historical WIC Food Item Price Movement

The following table, Table VIII, illustrates the variation in price movements during fiscal years 1984-90 for commodities that are representative of foods included in the WIC basket. Overall, there was considerable year-to-year and commodity-to-commodity variation in price movements. The average growth rate for retail prices was highest for cereals with 6.8 percent annual growth. The prices of milk, peanut butter, and eggs experienced the lowest growth, with each averaging price inflation of only 3.7 percent per year. Cheese (4.2 percent), frozen fruit and juices (4.2 percent), and dry beans (5.9 percent) were in the middle. Each commodity showed wide variation in retail price inflation rates over the period. All but frozen fruit and juices exhibited at least one year in which the growth rate exceeded the average rate for cereal prices, the WIC item with the highest average growth rate. In addition, frozen fruit and juices and dry beans each experienced at least one year in which the price declined. The net adjusted cost of infant formula to the WIC Program decreased an average of 6.9 percent per year. The wholesale price of formula rose quickly during the earlier years but WIC formula costs dropped precipitously after the inception of infant formula rebates.

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[2]The average per can rebate is only for infant formula subject to a rebate.

[3]Infant formula rebate initiatives began in FY 1988.

In terms of price movement, no single item in the WIC food package appears to be representative of all the other items. The prices are subject to wide fluctuations in growth rates and do not appear to move together in any systematic manner. In 1990, milk, cheese, and infant formula each experienced the largest annual growth rate in retail prices during the period. Thus, the items accounting for over 70 percent of WIC basket costs caused a significant increase in overall WIC costs. Conversely, in 1987, when infant formula, peanut butter and eggs realized large price increases, cheese, milk and frozen fruit and juices experienced rather modest increases. Since no single item is representative of changes in WIC food costs, a composite index of prices for the entire WIC basket is needed to monitor and forecast WIC basket food costs.

TABLE VIII.   Trends in WIC basket components, 1984-1990 (1988 = 100).

Fiscal year	Milk	Cheese	Price trends Infant formula 1/	Cereal	Frozen fruit & juices	Peanut butter	Dry beans	Eggs
Price index								
1984 2/	95.8	93.7	79.5	81.1	88.6	83.3	100.2	120.4
1985	97.5	95.3	84.9	84.4	91.6	85.6	102.7	98.6
1986	96.5	95.6	89.7	89.1	90.2	87.3	102.7	107.1
1987	98.1	97.4	100.0	94.3	91.8	98.6	100.7	104.0
1988	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1989	106.3	105.8	60.9	111.1	105.6	100.3	133.3	123.3
1990	118.4	119.3	44.9	120.1	112.9	103.3	136.3	137.4
Percent change from previous year								
1985	1.9	1.7	6.8	4.1	3.4	2.8	2.5	-18.1
1986	-1.1	0.3	5.7	5.6	-1.6	2.0	0.0	8.5
1987	1.7	1.8	11.5	5.8	1.8	12.9	-2.0	-2.9
1988	1.9	2.7	0.0	6.0	8.9	1.4	-0.7	-3.8
1989	6.3	5.8	-39.1	11.1	5.6	0.3	33.3	23.3
1990	11.4	12.8	-26.4	8.2	6.9	3.1	2.3	11.5
Average change 1984-90	3.7	4.2	-6.9	6.8	4.2	3.7	5.9	3.1

1/   Adjusted Net Cost of Formula to the WIC Program.   Reflects actual total program expenditures for infant formula.

2/   Based on partial year data

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IV. A WIC-SPECIFIC INFLATION INDEX

The 1985 Version

In 1984, at the request of FNS, ERS developed an index of WIC
food costs.[4] The index was based on the costs of the food
components comprising the WIC basket. Forecasts were based on
routinely available ERS forecasts of the commodity groups that
were most closely related to the WIC items. In some cases these
were close matches and in others they were not. The Center for
Budget and Policy Priorities reviewed the 1984 version of the WIC
index and raised a number of valid concerns.[5] The Center was
especially concerned with the infant formula component. FNS had
been unsuccessful in its efforts to obtain information from the
infant formula companies about formula price projections. Due to
the lack of ongoing and historic retail price information on
infant formula and detailed knowledge about the infant formula
industry, ERS forecasted movements for this component of the
model using forecasts of the all-items Consumer Price Index (CPI)
as a proxy.

The all-items CPI proved to be a poor proxy for forecasting
movements in infant formula prices as formula prices rose much
faster than the all-items CPI during the ensuing period. Other
concerns were raised about the use of forecasted indexes for
broad food categories to proxy movements of specific WIC items.
Use of the Processed fruit and vegetables CPI for WIC fruit juice
which is primarily orange and apple juice is a case in point.
There was a desire for forecasts more closely related to specific
WIC items. However, there were no other forecasts available on a
consistent and regular basis. As a consequence, the ERS index
was used for only one year, Fiscal Year 1985, before FNS returned
to using the OMB forecast of the TFP.

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[4]/ Matsumoto, Masao. 1984. "Forecasting WIC Program Food
Costs," Staff Report No. AGES840413, Economic Research Service,
USDA.

[5] In August 1985, the Center published a critique of the
index in its paper, "Forecasting WIC Food Price Changes: An
Analysis of the Agriculture Department's New WIC Food Price
Index."

WIC FOOD COST INDEX - 1993 VERSION

ERS and FNS have worked together, with assistance from BLS, to
try to develop an improved index of WIC food costs for program
monitoring and a model for forecasting prices of WIC food
components necessary for estimating future WIC food basket costs.
The model incorporates and integrates data from a wide variety of
sources to make the best use of available information. The 1992
version of the index model also includes a component to capture
the effects of infant formula rebates, which did not exist when
the earlier index was developed. The new index model is designed
to forecast changes in the retail cost of infant formula while
adjusting for the effects of infant formula rebates on WIC's
average food package costs. The following sections describe the
index methodology employed, the development of representative WIC
market baskets, the choice of prices, forecasts of price
movements, and adjustments for infant formula rebates.

WIC Food Baskets and Index Methodology

The WIC index provides national level estimates of movements in
the cost of typical packages for women, infants and children.
The index is a fixed-weight (Laspeyres type) market basket index
of cost.[6] The index can be thought of as measuring changes in
the cost of a particular (fixed) market basket of WIC foods.
Each food in the basket is assigned a weight according to its
share in the basket. The weights are assigned as a function of
the quantity of each item in the basket. Multiplying a measure
of market price by these weights yields a measure of the
expenditure or cost of the basket.

The construction of an index requires appropriate market basket
weights and prices to reflect actual costs incurred in the
program. Both item prices and WIC baskets are known to vary
widely by state and local area. Table IX below provides the FY
1990 average food package costs for several states and
illustrates cost variation among the states. As shown in Table
X, there is even significant variation among states in the same
region. States are allowed, within the requirements to protect
the nutritional integrity of the food package, to substitute
among approved items and may restrict or curtail usage of
particular items. For example, apple juice can be substituted
for orange juice. In addition, states may restrict or curtail
use of particular foods during years when prices are rising more
rapidly than expected, as in Fiscal Year 1990, for example,
substituting dried beans for more expensive peanut butter. These

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[6] Wallace, William H. and William C. Cullison. 1970.
Measuring Price Changes: A Study of the Price Indexes, Third
Edition, Federal Reserve Bank of Richmond, Richmond.

adjustments vary from state to state and, along with the variation in participant caseload mix, contracted infant formula rebate amounts, and retail food prices, contribute to the difference in states' average WIC food package cost.

TABLE IX
VARIATION IN AVERAGE FOOD PACKAGE COSTS AMONG SELECTED STATES
Fiscal Year 1990

STATE	AVERAGE FOOD PACKAGE COST* ($)
California	27.95
Colorado	28.78
Florida	27.58
Georgia	24.90
Illinois	29.16
Minnesota	26.34
New York	32.86
Oklahoma	33.03
Texas	28.91
Washington, DC	29.94
National Average	30.20

NOTE: The average WIC food package cost is derived by dividing the program's total annual food expenditures by the average monthly participation. The result is then divided by 12 to yield an average monthly food package cost per participant for the fiscal year. Prior to 1988, WIC's average food package cost was equivalent to the average retail or shelf price of the food package. From 1988 on, WIC's average food package cost is a net cost after accounting for the effect of infant formula rebates and other cost containment.

TABLE X
VARIATION OF AVERAGE FOOD PACKAGE COST
AMONG STATES IN THE NORTHEAST REGION
Fiscal Year 1990

State	Average Food Package Cost ($)
Connecticut	37.18
Maine	32.73
Massachusetts	28.51
New Hampshire	32.34
New York	32.86
Rhode Island	31.63
Vermont	30.52
Average for Region	32.55

NOTE: The average WIC food package cost is derived by dividing the program's total annual food expenditures by the average monthly participation. The result is then divided by 12 to yield an average monthly food package cost per participant for the fiscal year. Prior to 1988, WIC's average food package cost was equivalent to the average retail or shelf price of the food package. From 1988 on, WIC's average food package cost is a net cost after accounting for the effect of infant formula rebates and other cost containment.

The index measures the cost of the typical or representative WIC baskets, compiled from national data on the average quantities of food prescribed, for pregnant, nursing, and postpartum women, infants, and children. The index model does not attempt to measure the costs in specific states or regions. A different index is developed for each of the WIC target population groups to account for the known variation in food baskets provided to each group.

Nationally, the index uses representative prices or price indexes to measure prices for WIC market basket components. Overall increases or decreases in WIC national costs are likely to indicate the general direction of price movements in particular areas due to the close inter-relationship of state and national food markets. Because the basket is intended to be nationally representative, it may not capture cost levels in specific states or regions. Differences are likely to occur due to variation in local product availability, transportation cost, marketing costs, weather conditions, and local demand. For this reason, the WIC basket costs are indexed rather than measuring actual dollar

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costs. The index measures relative movements in WIC basket costs. Dividing the actual market basket cost by the cost in an arbitrary base year yields the change from year to year.

The formal definition of a Laspeyres index is:

$$I_t = \sum P_i^t Q_i^0 \Big/ \sum P_i^0 Q_i^0 \qquad (1)$$

or

$$I_t = \sum \left[\frac{P_i^0 Q_i^0}{\sum P_i^0 Q_i^0} \right] \left(\frac{P_i^t}{P_i^0} \right) \qquad (2)$$

where I is the index, P and Q are the prices and quantities of basket components, i denotes a particular commodity, t is the current time period under evaluation, and 0 denotes the base time period. The numerator in equation (1) represents the cost in period t of the basket defined or established in the base period 0. The denominator is a measure of the cost during the base period. Equation (2) is mathematically equivalent to equation (1). In equation (2), the index is expressed as a weighted sum of price relatives, where the weights are the cost or expenditure shares for each component in the base year. A price relative is simply a ratio of prices (index) for a particular component. The WIC index with a base period of 1988, evaluated for 1990 would be written as:

$$I_{1990} = \sum P_i^{1990} Q_i^{1988} \Big/ \sum P_i^{1988} Q_i^{1988} \qquad (3)$$

or

$$I_{1990} = \sum \left[\frac{P_i^{1988} Q_i^{1988}}{\sum P_i^{1988} Q_i^{1988}} \right] \left(\frac{P_i^{1990}}{P_i^{1988}} \right) \qquad (4)$$

The index is constructed by calculating the market basket cost for each period and dividing by the cost for the base period, 1988. Once constructed, the index can be updated in two ways. One way is simply to cost out the basket each future period and divide by the base period cost (equation (1)). The other is to calculate a price index (price relative) for each market basket component and multiply that by its respective cost share of the basket (equation (2)). Both procedures yield the same result.

The price-relative index approach is used in this model. This approach focuses attention on changes in prices rather than price levels and is independent of the unit of measurement for price, such as dollars or cents per quart, gallon, or pound. It also allows a proxy to be used to measure price changes in a particular item rather than actual price levels. For example, CPI - milk may be used in place of the retail dollar price. This procedure is valid as long as the price and its proxy move together proportionately.

FNS' "Study of WIC Participant and Program Characteristics, 1988" commonly referred to as "PC 88,"[7] provided the quantities used to develop the market baskets. The PC 88 data collection occurred in March 1988, prior to the nationwide implementation of infant formula rebates. Only five states had infant formula contracts during the PC 88 data collection period. Although PC 88 data are the most recent source of information on the quantities of foods prescribed to WIC participants, infant formula rebates and changes in tailoring practices may affect the average prescribed amounts. Under tailoring the amount of food prescribed is based upon the needs and nutritional risk status of the individual participant and may be less than the maximum quantity established by WIC regulations. Tailoring relates to participants' nutritional risk status only and is not used for cost savings purposes. FNS does not know if or to what extent the prescribed quantities for each category have changed due to the impact of infant formula rebates or to changes in tailoring practices at the WIC local agency level. FNS has some anecdotal indication that many WIC state agencies retained the administrative adjustments made in Fiscal Year 1990. If so, these adjustments have almost certainly affected the types and average quantities of foods currently prescribed to program participants. As part of the biennial Participant Characteristics data collection, FNS will attempt to collect more recent data on average food prescription data. However, this data is requested as part of an optional data set, which WIC State agencies are not required to submit. Twenty-three WIC State agencies submitted food prescription data in response to the PC 1992 data collection. However, these agencies were not a statistically representative sample and thus the data is not appropriate for purposes such as the WIC index.

Table XI provides quantity and cost share weights for each of the constructed WIC baskets. Overall, infant formula is one of the most important items in the average WIC basket. Formula comprises more than 90 percent of the cost of the WIC basket for infants. In 1988, due to its high cost and the relative number

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[7]/ Food and Nutrition Service. 1990. Study of WIC Participation and Program Characteristics, 1988 vol. 1 and 2. USDA, Alexandria, VA.

of infants in the program, infant formula comprised slightly less
than 38 percent of the retail cost of the average WIC basket for
all participants after adjusting for rebates. Dairy products are
the next most important item in the index after infant formula.
Milk and cheese comprise over 54 percent of the cost of the WIC
basket for pregnant, breast-feeding, and postpartum women and
about 47 percent of the basket for children. There are no dairy
products (with the exception of dairy based formula) in the
baskets for infants. Juice comprises about the same cost share
of the baskets for women and children, ranging from 19-23
percent. Juice comprises less than 3 percent of the basket for
infants and about 15.2 percent overall. Cereal accounts for
about 14-19.6 percent of the baskets for women and children with
children being in the middle of the range. Peanut butter
comprises about 2.1-2.9 percent of the basket for pregnant and
breastfeeding women and children but less than .1 percent for
postpartum women. Eggs account for about 5-6 percent of the cost
of WIC baskets for women and children and about 3 percent
overall. Dry beans are the smallest component overall,
comprising no more than 1 percent of any basket and about 0.5
percent overall.

The WIC baskets for pregnant and breastfeeding are very similar
in composition and total cost while that for postpartum women is
considerably smaller (about 21 percent lower cost) but comparable
in cost shares. All baskets for women contain the same
approximate cost share of 54 percent for dairy products. The
basket for postpartum women spends relatively more for cereal
(19.5 percent vs. 14-14.6 percent) but less for peanut butter (.1
percent vs 2.3-2.9 percent) and juice (19 percent vs 23.2
percent).

Each basket is priced out using nationally representative retail
prices for the items comprising the basket, (Table XI), except
infant formula which is adjusted by the average rebate. Retail
prices were obtained from one of two sources: the Bureau of
Labor Statistics (BLS) or a data base of retail supermarket
prices compiled by the A.C. Neilsen Company from a nationally
representative sample of supermarkets with electronic scanning
equipment. If available, the BLS national average retail prices
are used. BLS retail prices are used for peanut butter, milk,
cheese, orange juice, and eggs. However, BLS does not report
retail prices for all WIC items, most notably infant formula but
also dry beans, infant cereal, and adult ready-to-eat breakfast
cereal.

Actual prices, net of infant formula rebates, are required to
develop the cost share for the base year (1988). However, once
the base year cost-share weights are determined, only price
relatives (a measure of the proportionate price change relative
to the base year) are needed to update the index (see equations
(2) and (4)). For example, the BLS CPI for cereal products is

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used to update the infant and adult cereal components of the WIC index. Likewise the CPI-fresh milk is used to update the milk component, the CPI-cheese is used to update the cheese component, the CPI-eggs is used to update eggs, the CPI-processed fruit is used to update the juice component, and the retail price of peanut butter is used to update the peanut butter component. Dry bean prices are updated using A.C. Nielsen[8] prices. Infant formula prices are updated using wholesale prices for truck load quantities of formula, with adjustments made for rebates.

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[8]ScanTrac Data Base, A.C. Neilsen Marketing Services

TABLE XI. **Average monthly quantities in prescribed WIC baskets and cost shares in 1988.1/**

Item	Pregnant Women	Breast-feeding Women	Post-partum Women	All Women	Infants	Children 1-4 years	1988 Average
Quantity weights:							
Milk (qt.)	19.76	19.74	14.92	18.60	0.00	15.56	11.29
Cheese (lb)	2.00	2.04	1.85	1.97	0.00	1.39	1.08
All Formula	0.00	0.00	0.00	0.00	353.22	12.47	117.77
Cereal adult (oz)	31.27	30.05	33.05	31.54	0.00	31.85	21.69
Cereal infant (oz)	0.00	0.00	0.00	0.00	9.43	0.00	2.99
Juice (oz)	64.34	64.12	41.58	58.88	9.16	54.72	41.19
Peanut butter	6.51	8.18	0.22	5.22	0.00	5.20	3.56
Beans	0.49	0.45	0.03	0.38	0.00	0.50	0.31
Eggs	1.99	1.96	1.87	1.96	0.00	1.76	1.25
Cost shares:	----------	----------	----------	percent	----------	----------	----------
Milk (qt.)	36.46	36.38	34.81	36.27	0.00	33.07	21.35
Cheese (lb)	17.60	17.93	20.59	17.98	0.00	14.09	9.65
All Formula	0.00	0.00	0.00	0.00	95.15	4.80	37.69
Cereal adult (oz)	14.62	14.04	19.54	14.97	0.00	17.15	10.23
Cereal infant (oz)	0.00	0.00	0.00	0.00	2.18	0.00	0.82
Juice (oz)	23.23	23.13	18.98	22.78	2.67	22.76	15.21
Peanut butter	2.31	2.89	0.10	2.23	0.00	2.12	1.35
Beans	0.79	0.73	0.06	0.70	0.00	0.93	0.53
Eggs	4.98	4.90	5.92	5.06	0.00	5.08	3.17
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total basket:							
Cost ($/month)	31.54	31.58	24.95	30.73	39.12	27.39	31.74
Cost relative to avg. basket	99.44	99.55	78.65	96.89	123.33	86.33	100.00

1/ Cost shares are derived from BLS and A.C. Nielsen ScanTrac data for 1988.

TABLE XII. WIC retail food price inflation index (1988 = 100)

| Fiscal Year | TFP Index | Women | | | | Infants | Children | Average 1988 Mix |
		Pregnant	Breast-feeding	Post-partum	All			
Level:				-- Index --				
1984 1/	88.7	92.6	92.6	92.6	92.6	79.8	91.6	87.4
1985	90.1	93.7	93.7	93.5	93.6	85.1	92.9	90.1
1986	91.2	94.1	94.1	94.3	94.2	89.7	93.7	92.3
1987	97.4	96.3	96.3	96.4	96.3	99.7	96.3	97.6
1988	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1989	108.9	107.7	107.6	108.0	107.7	63.2	105.7	90.2
1990	114.8	118.3	118.2	119.0	118.4	48.3	114.9	90.6
Change from previous year:				-- Percent --				
1985	1.6	1.2	1.2	1.0	1.2	6.6	1.4	3.1
1986	1.3	0.5	0.5	0.9	0.6	5.5	0.9	2.5
1987	6.8	2.3	2.3	2.2	2.3	11.1	2.8	5.7
1988	2.7	3.9	3.8	3.8	3.8	0.3	3.8	2.5
1989	8.9	7.7	7.6	8.0	7.7	-36.8	5.7	-9.8
1990	5.4	9.9	9.9	10.2	9.9	-23.6	-8.7	0.5
Average percent change from previous year:								
1984-90	4.4	4.2	4.2	4.3	4.2	-6.1	3.9	0.7

1/ Based on last three quarters of fiscal year.

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TABLE XIII. WIC basket items, sources of price data, and average prices for 1988.

WIC item	Source	Price per unit
Peanut butter	BLS retail price of 16 oz. container	11.17¢/oz.
Milk	BLS retail price of 1/2 gallon of fresh, whole, fortified milk	58.2¢/qt.
Cheese	BLS retail price of 1 pound of American processed cheese	277.6¢/lb.
Infant formula	A.C. Nielsen average price of 13 oz. concentrate less 9 cents average per can rebate.	10.54¢/oz.
Adult cereal	A.C. Nielsen average price of WIC approved ready-to-eat cereals	14.75¢/oz.
Infant cereal	A.C. Nielsen average price of WIC approved infant cereals	9.06¢/oz.
Juice	BLS retail price of frozen concentrate, 12 oz. can	11.39¢/oz.
Dry beans	A.C. Nielsen retail price of dry beans	51.0¢/lb.
Eggs	BLS retail price of dozen grade A large fresh eggs	85.4¢/doz.

Monitoring WIC program food package costs with the index requires updating the price components of the composite indexes. With the exception of infant formula and dry beans, adequate measures of relative price movements are available on a monthly basis. The wholesale price of infant formula is currently the best indicator of retail price movements available on a timely basis. This price is then adjusted by the national average rebate to obtain an estimate of the net price movement. However, given the relative importance of infant formula prices to WIC costs, alternative sources of retail prices for infant formula continue

to be explored. The index model forecast indicates that, even after adjusting for the impact of formula rebates, the cost of the infant food package will rise more rapidly than that of any of the other food packages over the next five years.

There were several options considered for the infant formula pricing component of the index. First, government sources were investigated as a source of data. However, BLS reports neither the retail prices nor a price index for formula. BLS does collect a limited amount (about 15-20 observations a month) of data on infant formula but it is insufficient for public reporting on a monthly basis. BLS researched its retail price data base and was able to derive some estimates of infant formula prices. The data do not meet BLS publication quality standards for monthly data but may be a useful indicator on a quarterly basis in conjunction with wholesale prices.

There are also no current estimates of dry bean prices which must be estimated using a combination of proprietary supermarket price data, farm level prices, and estimates of marketing costs. However, given that dry beans account for less than 1 percent of total costs, errors arising in this component will have minimal effect on the overall index (Table XI).

USDA contracted to purchase proprietary retail market data for the period June 1989 through June 1991. This will extend the existing retail price data base which begins in 1987 and could provide additional insight into the relationship of retail prices of WIC specific foods to BLS retail prices and price indexes and to the relationship between retail and wholesale prices of infant formula.

Two aggregate WIC baskets were also constructed: one for all women and one for all participants. These baskets weight average individual indexes with the relative number of participants in each group and the relative cost of each basket being used as weights. Over time, the individual indexes change only due to prices of the items in the basket. The components of the individual baskets do not change. The basket constructs also assume that no substitution of items is allowed, such as substituting apple juice for orange juice when orange juice prices rise. However, the aggregate indexes change for two reasons: changes in item prices and changes in the participant caseload mix. Since each participant group has a different basket, the aggregate basket is allowed to change to reflect the new mix of participants. For example, FNS expects that as the WIC program expands enrollment, the proportion of women and children will increase relative to infants. As a consequence, infant formula becomes a smaller share of the average WIC basket even though each infant is assumed to receive the same amount of formula.

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Some care must be used in calculating group indexes, such as for all women or all participants, from the individual disaggregate indexes. Group indexes must account for differences in the relative cost of each basket making up the group as well as the relative number of participants in each group. Failure to account for both of these factors will result in a biased and inaccurate group index. Another way of visualizing this weighting procedure is to see that the average total cost for all participants is the sum of expenditures on each participant group divided by the total number of WIC participants.

FORECASTING:

Forecasts of the WIC index depend upon available forecasts for price movements of the individual foods comprising the baskets. The choice of alternative approaches to forecasting WIC components is heavily dependent upon several factors: (1) the timing and availability of component price forecasts, (2) the reliability of component forecasts, (3) and the complexity (costs) of assembling the component forecasts. For example, a structured econometric model is data-intensive and requires that one be able to forecast the explanatory independent variables in the model. On the other hand, pure time series models depend only on past trends in the variable being forecast. However, time series models are unlikely to identify structural changes that may occur in the individual food-item markets. Each approach has its advantages and disadvantages.

Many components of the WIC index are tied to the USDA Baseline price projections and the ERS Monthly Update of economic conditions in the agriculture sector. The USDA Baseline is a set of projections internal to the Department of Agriculture for the agricultural sector used to support ongoing Departmental activities including budget reviews, farm program management, and agricultural policy analysis. The Baseline incorporates existing program legislation and sensitive economic information available at the time of projection. It is developed in coordination with several USDA agencies under the lead of ERS. The Baseline provides a common benchmark upon which alternative policy and program scenarios are compared. For these reasons the Baseline was chosen to provide the basic underlying information upon which WIC price movements are based. Baseline price forecasts are updated twice a year (February and August) and include forecasts for about 16 broad retail food categories such as dairy, cereal and bakery, eggs and other similar aggregate food groups. Baseline forecasts do not include fluid milk, cheese, dry beans, breakfast cereal, or peanut butter. The forecasts are for calendar year intervals over 10 years.

The ERS Monthly Update is used to supplement and update the Baseline projections used in the WIC index. The Monthly Update, like the Baseline, is an internal document that provides updates

and within year forecasts of economic conditions in the
agricultural sector.

Price forecasts are developed individually for each WIC food and
aggregated for each WIC basket: infants, children, pregnant
women, lactating women, and postpartum women. An overall "all
program" food price index is also calculated based on projected
program participation rates for the respective groups.

A structured econometric time series model is used for each WIC
item except formula. The structured models relate the measure of
retail price to more basic market factors that ERS forecasts on a
routine and regular basis in the Baseline and Monthly Update.
Thus, the model is tied to and consistent with USDA projections
of basic economic factors. The actual models used in forecasting
the WIC item components are reported in Appendix A.

Tables XIV, XV, XVI, and XVII contain comparisons of the revised
ERS WIC index for the selected WIC baskets with the Thrifty Food
Plan index for the historic period 1984-90 and forecasts for
1991-96. Comparing the percent change from year to year reveals
that the TFP almost always overstates the change in the WIC cost
index. This can be seen graphically in Exhibit 3. For example,
the TFP completely misses the effects of rebates during the post
1988 period. However in the outlying years, after the rebate
effect stabilizes, both forecasts appear to increase at about the
same rate. This suggests that considerable attention needs to be
given to forecasting net formula costs, something that cannot be
accomplished within the current TFP forecasting framework.

Also note that the different WIC baskets have distinct growth
rates in cost. The WIC-infants basket, driven almost entirely by
the cost of formula with an adjustment for formula rebates, has
the highest growth rate for cost during the forecast period,
1991-96. The growth rate in costs for children is slightly
higher than that for women but is substantially less than that
for infants and is less than that of the TFP. All WIC basket
costs are projected to grow at slower rates than the TFP. This
is due to the impact of infant formula rebates on the cost of the
infant basket and the overall average WIC per-participant food
cost.

The forecasts of the WIC indexes vary significantly by type of
basket. Projected costs for infants rise the most over the five
year period from 1991 to 1996, while those for women are
projected to grow the least. The projected costs for the infant
basket rise at about 6.3 percent per year. The average rate of
cost increase for each of the women's baskets is approximately
equal at 2.1-2.2 percent per year. The rate for children is
slightly higher at 2.3 percent per year. In contrast, OMB
projected the Thrifty Food Plan to increase at an average rate of
3.8 percent per year, higher than the rate for women and children

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but less than that for infants. Overall, the composite WIC index
is projected to increase at a lower average rate than the Thrifty
Food Plan, 3.0 percent verses 3.8 percent. The projected change
in composition of the WIC participant mix toward more children
and relatively fewer infants has only a minor impact on the
composite index. The index held constant at the 1988 participant
mix is projected to increase at about 3.1 percent compared to 3.0
percent after adjusting for the expected change in participant
mix.

TABLE XIV. Actual and forecasted trends in WIC food categories, 1984-96 (1988=100).

Fiscal Year	Milk	Cheese	Infant formula	Cereal	Frozen fruit & juices	Peanut butter	Dry beans	Eggs
Actual:								
1984 1/	95.8	93.7	79.5	81.1	88.6	83.3	100.2	120.4
1985	97.5	95.3	84.9	84.4	91.6	85.6	102.7	98.6
1986	96.5	95.6	89.7	89.1	90.2	87.3	102.7	107.1
1987	98.1	97.4	100.0	94.3	91.8	98.6	100.7	104.0
1988	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1989	106.3	105.8	60.9	111.1	105.6	100.3	133.3	123.3
1990	118.4	119.3	44.9	120.1	112.9	103.3	136.3	137.4
Forecast: 2/								
1991	116.5	122.0	54.4	128.2	113.3	117.0	112.9	135.0
1992	112.3	120.9	56.1	134.2	121.0	116.0	124.1	124.2
1993	111.7	122.0	57.6	142.0	126.1	116.6	130.2	113.9
1994	112.9	124.5	59.8	148.8	130.2	118.3	134.3	121.9
1995	116.2	128.5	62.1	155.6	135.1	119.9	136.3	121.0
1996	120.4	133.2	65.0	162.3	139.6	122.7	140.4	127.6

1/ Based on the first three quarters of 1984.
2/ Forecasts based on data available as of August 1991.

TABLE XV. Actual and Forecasted WIC Food Categories: 1984-96 (1988=100).

Fiscal Year	Milk	Cheese	Infant formula	Cereal	Frozen fruit & juices	Peanut butter	Dry beans	Eggs
Actual: Percent change from previous year								
1985	1.9	1.7	6.8	4.1	3.4	2.8	2.5	-18.1
1986	-1.1	0.3	5.7	5.6	-1.6	2.0	0.0	8.5
1987	1.7	1.8	11.5	5.8	1.8	12.9	-2.0	-2.9
1988	1.9	2.7	0.0	6.0	8.9	1.4	-0.7	-3.8
1989	6.3	5.8	-39.1	11.1	5.6	0.3	33.3	23.3
1990	11.4	12.8	-26.4	8.2	6.9	3.1	2.3	11.5
Average change	3.7	4.2	-6.9	6.8	4.2	3.7	5.9	3.1
Forecast:								
1991	-1.6	2.2	21.2	6.8	0.3	13.2	-17.2	-1.8
1992	-3.7	-0.9	3.1	4.7	6.9	-0.8	9.9	-8.0
1993	-0.5	0.9	2.7	5.8	4.2	0.5	4.9	-8.3
1994	1.1	2.0	3.9	4.8	3.3	1.4	3.1	7.0
1995	2.9	3.2	3.7	4.6	3.7	1.4	1.5	-0.7
1996	3.6	3.7	4.8	4.4	3.3	2.3	3.0	5.5
Average	0.3	1.9	6.6	5.1	3.6	3.0	0.9	-1.1

TABLE XVI. Actual and Forecasted Thrifty Food Plan and WIC Indexes of Food Cost, 1984-96 (1988 = 100).

Fiscal Year	TFP Index 1/	Women — Pregnant	Women — Breast-feeding	Women — Post-partum	Women — All	Infants	Children	Average participant mix 1988	Average participant mix Actual
Actual:									
1984 2/	88.7	92.6	92.6	92.6	92.6	79.8	91.6	87.4	87.6
1985	90.1	93.7	93.7	93.5	93.6	85.1	92.9	90.1	90.3
1986	91.2	94.1	94.1	94.3	94.2	89.7	93.7	92.3	92.4
1987	97.4	96.3	96.3	96.4	96.3	99.7	96.3	97.6	97.6
1988	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1989	108.9	107.7	107.6	108.0	107.7	63.2	105.7	90.2	90.0
1990	114.8	118.3	118.2	119.0	118.4	48.3	114.9	90.6	89.9
Forecasts: 3/									
1991	120.6	119.4	119.3	120.4	119.6	57.6	116.5	95.0	94.0
1992	125.3	119.8	119.7	120.7	120.0	59.5	117.3	96.2	95.0
1993	130.0	121.7	121.5	122.6	121.9	61.2	119.4	98.1	96.7
1994	134.6	125.0	124.8	126.1	125.2	63.6	122.9	101.1	99.5
1995	139.2	129.0	128.8	130.3	129.3	66.0	126.9	104.5	102.7
1996	143.8	133.8	133.6	135.3	134.2	69.2	131.7	108.7	107.2

1/ Thrifty Food Plan index forecasts based on OMB TFP forecasts available as of August 1991.
2/ Based on data for the last three quarters of 1984.
3/ Based on data available as of August 1991.

TABLE XVII. Actual and Forecasted Thrifty Food Plan and WIC Retail Food Price Inflation Index: Percentage Change from Previous Year.

| Fiscal Year	TFP Index 1/	Women				Infants	Children	Average participant mix	
		Pregnant	Breast-feeding	Post-partum	All			1988	Actual
Actual:					-- percent --				
1985	1.6	1.2	1.2	1.0	1.2	6.6	1.4	3.1	3.0
1986	1.3	0.5	0.5	0.9	0.6	5.5	0.9	2.5	2.3
1987	6.8	2.3	2.3	2.2	2.3	11.1	2.8	5.7	5.6
1988	2.7	3.9	3.8	3.8	3.8	0.3	3.8	2.5	2.5
1989	8.9	7.7	7.6	8.0	7.7	-36.8	5.7	-9.8	-10.0
1990	5.4	9.9	9.9	10.2	9.9	-23.6	-8.7	0.5	-0.1
Forecasts: 2/									
1991	5.0	0.9	1.0	1.2	1.0	19.2	1.4	4.8	4.6
1992	3.9	0.4	0.3	0.2	0.4	3.4	0.7	1.2	1.0
1993	3.7	1.5	1.5	1.6	1.6	2.9	1.8	2.0	1.8
1994	3.5	2.7	2.7	2.8	2.8	3.9	2.9	3.1	2.9
1995	3.4	3.2	3.2	3.3	3.2	3.8	3.3	3.4	3.2
1996	3.3	3.7	3.7	3.8	3.8	4.7	3.8	4.0	4.3
Average 1991-96	3.8	2.1	2.1	2.2	2.1	6.3	2.3	3.1	3.0

Source: Based on data in Table XVI.

1/ Thrifty Food Plan projections based OMB projections dated 6/6/1990.

2/ WIC index forecasts made using data available as of August 1991.

Exhibit 3
COMPARISON OF ACTUAL AND FORCASTED
TFP AND WIC INDICES 1987 TO 1996

Inflation Rate
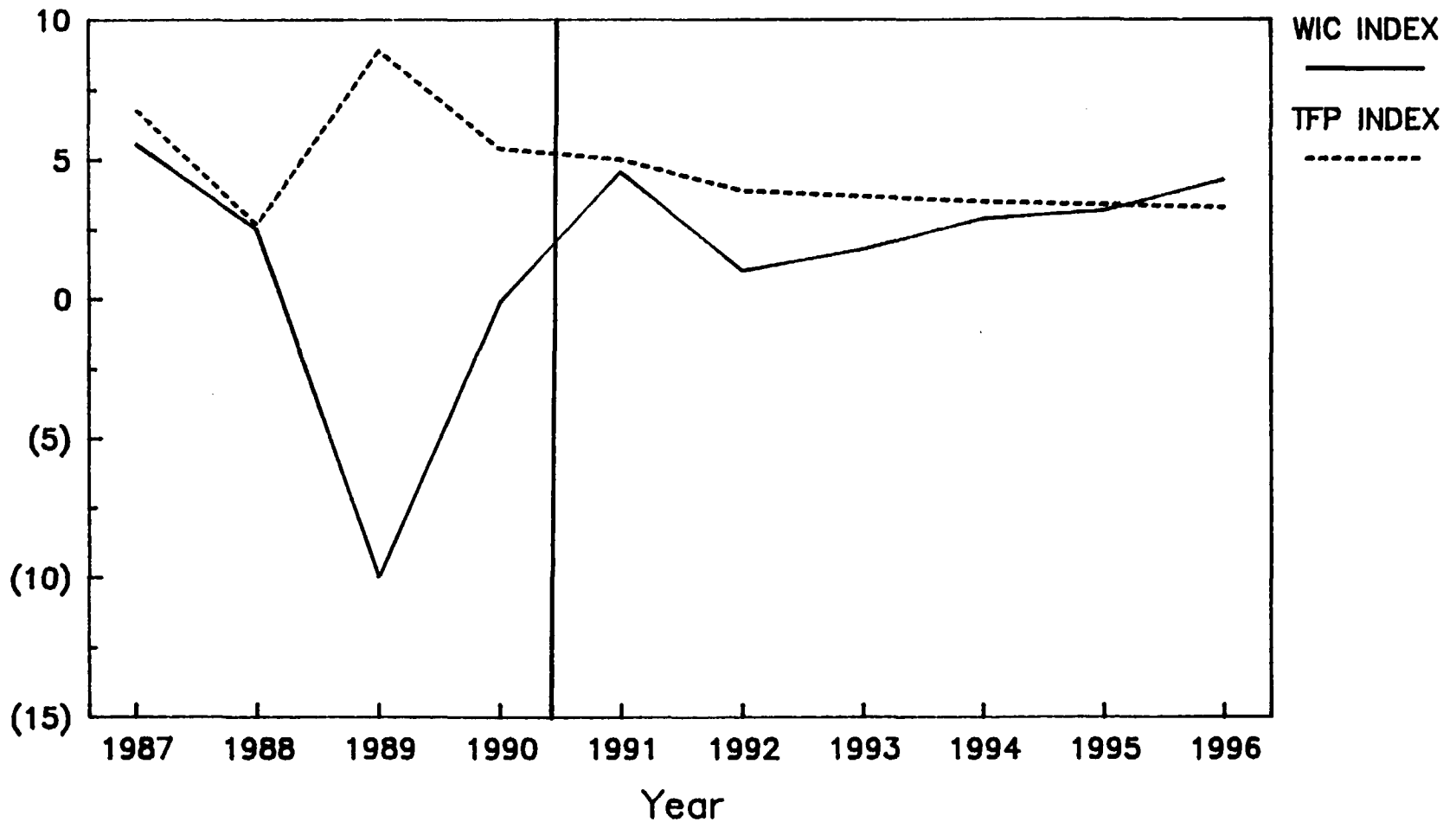
Actual Rates of Change 1987 to 1990
Forecasted Rates of Change 1991 to 1996

V. TESTING THE WIC INDEX MODEL

The index model was tested using several methods to determine how accurately it forecasts WIC food price changes as compared to the performance of the Thrifty Food Plan Index projections, which are currently used in the funding formula to allocate State WIC food grants. Both the WIC and TFP index projections were compared to actual changes in the WIC food package cost as reported by FNS for the test period. Initially, the model was tested using 1990 as the test year, the most recent year for which complete data was available. The results of these tests were presented in the interim report published in August 1992. Price and expenditure data for Fiscal Year 1991 became available after FNS published the interim report. Using this data, the model was tested again using 1991 as an additional test year.

The first test was to determine which forecasting technique performs most accurately, the WIC index model's projection of changes in the cost WIC composite basket or the OMB method to project changes in the cost of the Thrifty Food Plan. Using the index model, quarterly forecasts were produced for each of the two selected fiscal years. The forecasts were produced using the actual price data effective through July 1989 and 1990 and projecting the average WIC index for each quarter through September 1991. The model was then updated with price data effective through July 1992 to measure the direction and magnitude of the price of the WIC composite market basket for each quarter and the average for the entire fiscal year. The forecasts were then compared to actual measured changes. To similarly test the OMB method, the June 1989 and 1990 OMB economic assumptions for TFP costs were compared to the actual TFP costs reported by USDA's Human Nutrition Information Service. The results are presented in Tables XVIII and XIX below.

The results indicate that the index model underestimated the average cost of the WIC basket each quarter in FY 1990 by six to eleven percent (on an annualized basis). For the entire fiscal year, the WIC index model underestimated the cost of the WIC composite basket in FY 1990 by 9.6 percent. For the 1991 test, the index model's performance improved, however, its projection was 1.6 percent less than actual measured change. OMB's TFP projection in 1990 underestimated the average TFP cost by 3.2 percent. For 1991, the OMB forecast over-estimated the TFP cost by 1.5 percent. Both forecasting methods predicted lower cost increases for FY 1990 than actually occurred, and this would be expected given the unpredicted events which ignited food price inflation that year. Both methods showed improved forcasts for the FY 1991 test year and predicted price changes were within 1.5 percent of actual changes.

TABLE XVIII.A
ACCURACY OF WIC INDEX PROJECTIONS
FOR THE COMPOSITE WIC BASKET
FISCAL YEAR 1990

QUARTER	PROJECTED INDEX	ACTUAL INDEX	PROJECTED COMPARED TO ACTUAL
1ST	80.31	85.26	− 5.8%
2ND	79.83	88.58	− 9.9%
3RD	81.67	92.05	− 11.3%
4TH	83.20	93.66	− 11.2%
FY AVERAGE	81.25	89.89	− 9.6%

TABLE XVIII.B
ACCURACY OF WIC INDEX PROJECTIONS
FOR THE COMPOSITE WIC BASKET
FISCAL YEAR 1991

QUARTER	PROJECTED INDEX	ACTUAL INDEX	PROJECTED COMPARED TO ACTUAL
1ST	90.38	93.60	− 3.4%
2ND	90.61	93.44	− 3.0%
3RD	91.13	93.77	− 2.9%
4TH	91.76	94.98	− 3.4%
FY AVERAGE	90.97	93.95	− 1.6%

TABLE XIX.A
ACCURACY OF THRIFTY FOOD PLAN COST
PROJECTIONS
FISCAL YEAR 1990

MONTH	PROJECTED TFP	ACTUAL TFP	PROJECTED COMPARED TO ACTUAL
DECEMBER 1989	$ 324.20	$ 328.20	- 1.2%
MARCH 1990	327.50	343.50	- 4.7%
JUNE 1990	330.80	342.20	- 3.3%
SEPTEMBER 1990	334.10	345.20	- 3.2%
AVERAGE	329.15	339.78	- 3.2%

TABLE XIX.B
ACCURACY OF THRIFTY FOOD PLAN COST
PROJECTIONS
FISCAL YEAR 1991

MONTH	PROJECTED TFP	ACTUAL TFP	PROJECTED COMPARED TO ACTUAL
DECEMBER 1990	$ 353.10	$ 347.10	+ 1.7%
MARCH 1991	356.70	353.50	+ 0.9%
JUNE 1991	360.40	360.10	+ 0.1%
SEPTEMBER 1991	364.10	352.10	+ 3.3%
AVERAGE	358.57	353.20	+ 1.5%

The second test compares the WIC index and TFP index projections
to WIC food cost changes as reported by FNS for Fiscal Years 1990
and 1991. In this test, the change in the projected annual
average costs of the WIC index composite basket and the TFP are
compared to the actual change in FNS' average WIC food package
cost. The index model and OMB projections were compared to
determine which came closest to forecasting the actual change in
the average WIC food package cost from one fiscal year to the
next. The comparison is shown in Table XX below. This is the
measure of change which most closely approximates the method by
which the inflation adjustment is calculated for the funding

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formula. This comparison would indicate which forecast was more accurate in projecting WIC food cost inflation for the test period. This is important since the primary purpose of the index is to improve upon the TFP projection as the inflation adjustment in the state funding formula. For purposes of the funding formula, the accuracy of the annual inflation forecast is most critical.

FNS' cost data indicates that the average WIC food package cost increased 0.2 percent in FY 1990 and decreased 1.2 percent in FY 1991. Neither the TFP nor the WIC index forecast captured the actual change in FNS' average WIC food package cost for the two fiscal years. However, in 1990, the TFP projection may have been a better proxy for forecasting WIC inflation, due to its lower margin of error. Both the WIC index forecast and the OMB TFP forecast for Fiscal Year 1990 failed any reasonable test of performance. Both were off by more than 100 percent and would have provided poor guidance to WIC administrators in the early phases of planning 1990 outlays and caseload levels.

It should be noted, however, that FY 1990 was a particularly difficult period to project because of the unexpected magnitude of price increases for key WIC foods due to weather and market conditions. The average WIC food package cost in 1990 did not reflect the extent of shelf price inflation of WIC foods. The cost also reflected administrative changes in the quantities and types of food prescribed to WIC participants in response to rising food prices and the effects of infant formula rebates. In 1991, both the TFP and the WIC index projections would have over-estimated WIC food cost inflation. For Fiscal Year 1991, both methods predicted that WIC food costs would increase when actually the average WIC food package cost decreased by 1.2 percent. However, as discussed in an earlier section, many non-economic related factors can contribute to changes in FNS average WIC food package cost. Thus, it is extremely difficult for any economic indicator to produce reliable predictions of changes in the average WIC food package cost.

TABLE XX
COMPARISON OF WIC INDEX AND TFP PROJECTIONS
TO ACTUAL CHANGE IN FNS WIC COST

FISCAL YEAR	ACTUAL CHANGE IN AVERAGE WIC FOOD PACKAGE COST	PROJECTED CHANGE IN AVERAGE TFP COST	PROJECTED CHANGE IN WIC INDEX COMPOSITE BASKET
1990	+ 0.2	+ 4.4	- 9.4
1991	- 1.2	+ 5.0	+ 1.6

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Finally the WIC index model was tested to determine how accurately it forecasted price changes for the individual WIC commodities. The results are shown below in Table XXI A and B. Several WIC food items experienced considerable, unanticipated price increases during FY 1990. Major increases included a 11.4 percent increase in the retail price of milk, 12.8 percent increase for cheese, and 11.4 percent increase for eggs. The wholesale price of infant formula increased 13.2 percent in 1990. However, because of expansion of infant formula rebates, WIC's total formula costs in 1990 decreased 26.4 percent from the prior year's level. In both test years, the index model performed with varying degrees of accuracy in forecasting changes in the prices of the individual WIC foods. As might be expected from earlier discussion of the difficulty of projecting rebate savings, the model did not successfully predict changes in the price of infant formula, which comprises the largest proportion of WIC food expenditures. A detailed analysis of the quarterly forecasts for the individual commodities revealed no discernible patterns which would indicate that the model's projections are more accurate in any individual quarter or period of the fiscal year.

TABLE XXI.A
PROJECTED VS ACTUAL
INDEX OF INDIVIDUAL WIC FOOD COSTS
FY 1990 AVERAGE

WIC FOOD ITEM	PROJECTED INDEX	ACTUAL INDEX	PROJECTED COMPARED TO ACTUAL
MILK	107.80	118.39	- 8.9%
CHEESE	108.07	119.33	- 9.4%
INFANT FORMULA	34.21	44.86	- 23.7%
CEREAL	117.88	120.13	- 1.9%
JUICE	112.71	112.90	- 0.2%
PEANUT BUTTER	100.14	103.35	- 3.1%
DRIED BEANS/PEAS	115.46	136.32	- 15.3%
EGGS	111.97	137.45	- 18.5%

TABLE XXI.B
PROJECTED VS ACTUAL
INDEX OF INDIVIDUAL WIC FOOD COSTS
FY 1991 AVERAGE

WIC FOOD ITEM	PROJECTED INDEX	ACTUAL INDEX	PROJECTED COMPARED TO ACTUAL
MILK	114.65	117.39	- 2.3%
CHEESE	116.39	122.59	- 5.1%
INFANT FORMULA	48.04	54.02	- 11.1%
CEREAL	128.81	127.73	+ 0.8%
JUICE	120.56	112.21	+ 7.4%
PEANUT BUTTER	105.72	118.27	- 10.6%
DRIED BEANS/PEAS	129.70	117.50	+ 10.4%
EGGS	112.69	136.26	- 17.3%

The test results did not produce conclusive evidence to support a change in the current policy regarding the inflation adjustment used in the funding formula. OMB's TFP projections came closer to capturing the actual change in WIC average food package cost in 1990 while the WIC index performed better in 1991. Though the WIC index model showed promise, test results did not indicate that it would be an improvement over the TFP Index for projecting WIC inflation. In both years, actual WIC costs moved in the opposite direction predicted. Several factors impede the WIC Index model's performance and cannot be resolved at this time. These factors are related to missing or inappropriate data used to construct the model or to identify historical price trends. In addition, infant formula rebates complicate the model's forecasting capability. These factors are discussed below.

Most troubling is the inconsistency between the model's measurement of retrospective changes in the actual cost of the composite WIC market basket and FNS' reported WIC food cost data. This problem is believed to be related to differences between what the index model measures and what the FNS cost data represents. The WIC index market basket was constructed using data collected in 1988 as part of the WIC Participant Characteristics Study (PC 88). That study collected the average quantities of all WIC foods prescribed for each category of WIC participant. Food package tailoring practices and administrative adjustments initiated since 1988 have changed the composition of the average prescribed WIC food package. The PC 88 data may be

too dated to use for this purpose, as it does not accurately represent what is currently being prescribed to participants. This problem is compounded by yet another factor. The WIC market basket should really reflect the types and quantities of food purchased with WIC vouchers, e.g., average redemptions, not the quantities prescribed to participants. Although FNS does not collect redemption data, it is known that WIC participants do not always purchase the full quantity of foods prescribed to them. WIC cost and expenditure reports produced by FNS' Program Information Division (PID) reflect average monthly WIC food package costs which are based upon redemptions, not prescribed amounts. The composite WIC market basket should be constructed to reflect the types and quantities of all the foods purchased by WIC participants using their WIC vouchers. The optimal input data for the WIC index model would describe the average monthly purchases for each category of WIC participant. These two factors together, the used of outmoded data and the lack of redemption data, contribute significantly to the discrepancy between actual WIC food costs measured by the WIC index model and those reported in the PID reports.

Another problem with the WIC index model's performance is related to the accuracy of the price projections for the individual WIC foods. The model was tested using actual food price data for 1990 and 1991. The results were disappointing in that the model fails to accurately predict changes in prices of individual WIC commodities, particularly infant formula which comprises a significant proportion of WIC's average food package cost. ERS used food price data from several sources as input to the model. There were no available sources of quality price data for several of the WIC commodities, including infant formula and breakfast cereals, forcing ERS to use proxies in the model. Infant formula wholesale price was used as a proxy for retail prices. In addition to the lack of price data, because there is no redemption data available, as discussed above, orange juice serves as a proxy for all juices in the WIC Index model. However, WIC participants purchase a variety of fruit and vegetable juices.

Because the model attempts to adjust for the effects of rebates, forecasting the WIC index differs from forecasting other purely economic indices such as the TFP or CPI. The rebate adjustment to the WIC index attempts to capture factors which are unpredictable and not easily depicted within an economic framework. These include manufacturers' behavior in response to individual state bid solicitations and the individual state contractual arrangements. In addition, the history and data on infant formula rebates are relatively recent.

The test results brings into question the model's usefulness for predicting changes in the price of one or more food items which could have significant impact on the overall cost of the WIC food

package. The 1990 test year was a period that included unpredictable weather and market conditions which no forecast model would have been expected to capture. However, there were no such disasters in 1991 and the model still was unable to accurately predict price changes for most of the WIC foods.

VI. SUMMARY OF PUBLIC COMMENTS

FNS solicited comments on the WIC index model, both on its construction and its appropriateness for use in the funding allocation formula. Sixteen commenters responded to the interim report. An analysis of the public comments is presented in Appendix B. The majority of commenters responded that FNS should replace the TFP index currently used in the funding formula with a WIC specific index. However, most commenters acknowledged that this version of the WIC index model was not an acceptable alternative. Of those who offered specific comments regarding infant formula rebates, the majority were opposed to including an adjustment for rebates in the WIC index model. Of those who offered specific comments regarding the quality of the PC 88 data, the majority supported the use of the PC 88 food quantity data to construct the model, however, one commenter supported the use with reluctance.

VII. RECOMMENDATION REGARDING FURTHER DEVELOPMENT OF THE WIC INDEX MODEL:

For the reasons discussed above, the model's performance can not be improved upon using currently available data. Quality data are needed to further develop and improve the index model. Two types of data are required, WIC food quantity redemption data and WIC commodity price data.

The quantities of the individual WIC foods purchased or redeemed by participants are generated at the point-of-sale (POS). Ideally, electronic scanner technology could capture this data but developing this capability within the WIC program is a much longer term initiative. WIC retailers who currently use point-of-sale scanning equipment are capturing this data but do not retain it or provide it to the WIC state agencies. This information is provided to the WIC participant via a receipt for the food purchases. Options exploring the collection of point-of-sale data may be addressed over the next few years under a planned FNS research project. However, that is a longer term initiative which will not generate data for several years. Currently no WIC state agency collects data at this level of detail.

ERS used food price data collected by the Bureau of Labor Statistics (BLS). However, BLS does not collect price data for certain key WIC commodities, specifically infant formula and cereal. FNS explored with BLS the possibility of expanding BLS'

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average retail price data base to get more reliable retail level price data, particularly for cereal and infant formula. To accomplish this, BLS would have to increase the sample of stores from which price data are collected. This is a complex and lengthy process which is not currently feasible. Commercial market data, which FNS has used in the past with ERS and the Food and Drug Administration, is not available in a form that can be purchased and used economically for the WIC index.

Several types of data are needed to improve the construction and thus the performance of the WIC index model. At this time, it is infeasible to obtain the data. As discussed above, state-level food quantity data is not available for all the WIC state agencies. FNS attempted to collect more recent data on the average amounts of food prescribed to WIC participants as part of the 1992 Participant Characteristics Study (PC 92). Since submission of this data was optional, less than half of the WIC state agencies submitted average food prescription data in response to the PC 92 request. This response was an insufficient sample and, because it is not statistically representative, cannot be used in the WIC index. While this would improve the index's construction, it would not address the need for redemption data rather than prescription quantities. Most WIC state agencies do not have the capability to produce participant level data describing what is actually purchased with WIC food vouchers. It is possible, that with some modification, financial processing systems in a representative sample of WIC state agencies could be modified to enable the states to collect and report this type of data to FNS. However, this would require extensive negotiation on the part of FNS to attain States' cooperation. After repeated attempts, FNS was unsuccessful in getting more states to submit food prescription data as part of the PC 92 data collection. FNS will attempt to get more states to submit this information as part of the 1994 Participant Characteristics Study in April 1994. However, because it is not part of the mandatory data set, States are not required to submit this data.

An alternative approach is to construct the WIC index market basket using the maximum prescribable quantities established by WIC regulations. This assumes that no tailoring or administrative adjustments occur and that all participants receive the same categorical food packages. However, because such assumption would not reflect what is actually being prescribed to or purchased by WIC participants, the model's projections and measurements would continue to fail to capture actual changes in program food costs. This alternative also fails to address the problem related to the lack of retail price data for all of the WIC commodities. In addition, the alternative excludes infant formula rebates, and other State initiated actions which determine WIC food costs. These actions are non-economic factors which cannot be captured by economic

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indices such as the TFP or the WIC Index. Thus, constructing a WIC index in this manner provides little, if any, gain in precision over the current the TFP projections.

It must be noted that 1990 was an unusual year in which several unanticipated and unpredictable conditions existed, which could not have been captured by forecasting model. Since 1990, FNS has implemented other initiatives to enable the program to detect and respond, in a more timely manner, to changing food prices. FNS began reporting to the States, on a monthly basis, information to enable them to better manage the WIC Program. The monthly "Report on WIC Food Costs" provides information on historical and forecasted WIC food costs fluctuations, economic indicators, and early notification of situations which may affect WIC food or administrative costs and caseloads. In addition, FNS provides a monthly report to Congress on WIC Program funding and participation status. The Congressional report also includes information on food costs trends. FNS believes that these reports, along with other monitoring activities such as the new WIC reporting system allow State Agencies to adequately monitor their food costs and manage their caseloads. One commenter suggested that FNS consider using the WIC index as an additional measure to monitor food price inflation. While this is a possibility, because of the problems discussed above and the current efforts to streamline USDA administrative expenses, FNS does not believe that the added benefit would justify the cost incurred by USDA to maintain the WIC model.

It is therefore recommended that USDA expend no additional resources to continue to develop the WIC Index Model at this time. FNS believes that it is inadvisable to replace the TFP index with the current WIC index as the inflation adjustment in the funding formula. FNS is willing to consider further development of the WIC index model when better data becomes available. The WIC index project originated because of unanticipated food price increases. But as one commenter noted, even a good economic index can not predict the weather and market conditions which occurred in 1990.

APPENDIX A. FORECASTING EQUATIONS AND SUMMARY STATISTICS.

This appendix contains the econometric models, parameter estimates and summary statistics for the equations used in forecasting the commodity components of the WIC indexes. Models are updated before each forecast with the most recently available data. To provide additional insight into the robustness and stability of the model parameters, estimates are provided for three years, 1989, 1990, and 1991. The models are estimated with quarterly data beginning with January-March 1984 through April-June of the year indicated in the tables.

The models are estimated using the maximum likelihood estimator in the AUTOREG procedure of PC-SAS. In general, the autoregressive model is define as,

$$Y_t = X_t \beta_t + v_t$$

where,

$$v_t = \epsilon_t - \rho_{t-1} v_1 - \rho_2 v_{t-2} - \ldots - \rho_{t-p} v_{t-p}$$

and

> Y_t is the dependent variable,
> X_t is the vector of explanatory variables,
> β_t is a vector of structural parameters,

and where ϵ is normally and independently distributed with mean of 0 and variance of σ^2. Note that without loss of generality, the signs of the autoregressive parameters, ρ_i, are reversed from that reported in some literature.

During the model specification phase of the project, the autoregressive process was allowed to be as high as fourth order. Through a backward elimination process, statistically insignificant autoregressive terms were removed. In no model was the autoregressive term found to be higher than the first degree. This means that all ρ terms other than the first in equation 2 above were eliminated from the models.

The autoregressive model integrates an autoregressive (time series) error specification with a structured econometric model. The error specification allows past errors to influence future forecasts. For example, if ρ is negative and the estimate for the most recent period overstates the actual value, then the

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forecast for the next period will be adjusted upwards to incorporate the error information that is outside the structural portion of the model.

A number of model statistics are reported in each model for use in specification and evaluation. The statistics are defined below:

SSE   The error sum of squares

DFE   The degrees of freedom for the error

MSE   The mean square error

Root MSE   The square root of the mean square error

Durbin-Watson This statistic is used to test for the presence of
               a first order autoregressive process

SBC   The Schwartz information criterion; Schwartz
               (1978) developed this statistic to indicate the
               optimal order of the autoregressive process. It is
               similar to AIC below.

AIC   The Akaike information criterion; Akaike (1973)
               argues that optimal autoregressive order is chosen
               such that $AIC(p) = Min\{AIC(k) \mid k=1,...,m)$ where p
               and k represent the order of the autoregressive
               processes.

Reg RSQ   The total regression measure of fit computed as 1-
               error sum of squares/corrected sum of squares
               including adjustments for the autoregressive error
               term. This is a measure of how well the next value
               can be predicted from the structural part of the
               model and past error terms. For models with no
               intercept, no correction to the sum of squares are
               made for the intercept term.

Infant formula:

ERS does not have an ongoing activity that forecasts variables that relate satisfactorily to infant formula. Consequently, that component of the model is based entirely on historic price trends. A 4th order auto regressive model with a linear trend is used to predict the wholesale price of infant formula. While the model allows for 2nd through 4th order auto regressive terms, these have not been significant and are thus not used in the forecasting process. Only the first order auto-regressive term is used.

The wholesale price for the top three manufacturers is obtained from FNS. The data are entered into a monthly data base. The price data are then aggregated into a single price using fixed market share data provided by FNS (55 percent Ross, 35 percent Mead, and 10 percent Wyeth). The monthly data are then averaged to make quarterly data. These quarterly data for 1980-1 to present are then used to estimate the auto regressive model with a linear trend. The Autoreg procedure in PC-SAS is used. Forecasts are produced automatically and take into account the autoregressive error process. The model appears adequate for short-term forecasts but may not perform as well for extended forecasts where deviations from past trends are more likely.

Milk and Cheese models:

Milk and Cheese forecasting models are based on the same underlying ERS projections for the CPI-dairy products. The CPI-milk (BLS) is forecast using a 1st order auto regressive process, quarterly dummies, the CPI-all dairy and a linear time trend. ERS constructs a forecast of CPI-all dairy. This is linked to the CPI-cheese and the CPI-milk using the SAS Autoreg procedure. The resulting forecasts for the milk and cheese CPIs are used as movers for the respective component of the WIC indexes.

The model is of the form:

CPI-milk = B0 + B1*CPI-all dairy + B2*qtr2 + B3*qtr3 + B4*qtr4 + B5*time + ν_t

where $\nu_t = \epsilon_t - \rho_1 \nu_{t-1}$

The model for CPI-cheese is of the same general form. Parameter estimates are updated each time the data are revised. This allows the model to incorporate the new market information as it becomes available.

Peanut butter:

The retail price of peanut butter is forecast using an econometric model of major components, peanuts and marketing costs. Quarterly dummy variable are included to account for seasonal effects and an autoregressive error term is included. The quota price of peanuts is used to estimate the cost of the peanut component of the product. Forecasts of the quota of peanuts is available in the Baseline. The forecasting model is denoted by

P_{pb} = B1*QP + B2*Mktcost + B3*qtr2 B4*qtr3 + B4*qtr4 + ν_t

where $\nu_t = \epsilon_t - \rho_1 \nu_{t-1}$

P_{pb} = retail price of peanut butter (BLS) 1984 - present

Mktcost = Index of food marketing costs as reported in the <u>Food Cost Review</u>, published annual by ERS. It is an index of the processing, wholesaling, and retailing cost of marketing food. qtr2, qtr3, and qtr4 are seasonal dummy variables that take on the value 1 during the respective quarter, and 0 otherwise.

Dry beans:

Retail price data on dry beans are not available from BLS or other public sources. "Monthly" retail price data are available from A.C. Nielsen for the period 1987 to 1989 based on a nationally representative sample of supermarkets.[9] Annual data are available back to 1983. Dry beans are basically a farm commodity with little value added by the marketing system. Hence, the primary determinant of retail price of dry beans is the grower price for the commodity. Using the historical relationship between retail price and the grower price, the retail price is forecasted based on the grower price. ERS commodity specialists provide 5 year forecasts of the dry bean grower price as part of the USDA baseline forecasting activity.

The dry bean model is estimated by an autoregressive model as:

$$P_t = B_1 * GP_t + B_2 * Mktcost_t + \nu_t$$

where $\nu_t = \epsilon_t - \rho_1 \nu_{t-1}$

The forecasted price is used to move the dry bean component of the WIC index when current estimates are unavailable.

Eggs:

The forecasted price of eggs is available directly from the USDA baseline and ERS Monthly update. No additional forecasting or adjustments are necessary. It should be noted that eggs prices are subject to wide variations and are notoriously difficult to forecast with an acceptable degree of precision.

Fruit juice:

The fruit juice component is proxied directly by the CPI-processed fruit which is the closest price component available in the Baseline. The CPI-processed fruit tends to be much less volatile than the retail price of orange juice yet tends to track

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[9]/ Nielsen data are not reported on a monthly basis but rather in a combination of 4 and 5 week sales periods which correspond as closely as possible to calendar months.

the general trend in the retail price. Large swings in orange juice prices often reflect unforeseen weather conditions that cannot be forecasted with any reliable degree of accuracy. The more moderate CPI series reflects the substitute juices, such as apple juice, that are available in the market.

TABLE XXII. Infant formula model: parameter estimates and summary
statistics.

Variable	1989	Model 1990	1991
Intercept	1.41017***	1.48052***	1.53470***
	0.01360	0.05088	0.06930
TIME	0.08992***	0.10345***	0.11227***
	0.00302	0.01052	0.01311
A(1)	-0.60795***	-0.88014***	-0.93997***
	0.14112	0.11648	0.06801
SSE	0.01710	0.03036	0.03256
MSE	0.00049	0.00078	0.00076
SBC	-173.634	-171.868	-189.472
Reg Rsq	0.9633	0.8246	0.7567
Durbin-Watson	1.9387	1.9600	2.2034
DFE	35	39	43
Root MSE	0.02210	0.02790	0.02752
AIC	-178.547	-177.081	-194.958
Total Rsq	0.9925	0.9915	0.9942

Standard errors of the parameters are reported below the estimates.
*, **, *** denote statistical significance at the 10%, 5%, and 1% level.

TABLE XXIII. Milk model: parameter estimates and summary statistics.

Variable	Model 1989	Model 1990	Model 1991
Intercept	-9.3846	-26.5725***	-35.2179***
	9.2558	6.1419	6.3012
CPIDAIRY	1.0704***	1.2272***	1.2995***
	0.0831	0.0530	0.0552
QTR2	-0.1034	-0.0969	0.0103
	0.1205	0.1265	0.1408
QTR3	-0.3509**	-0.3328**	-0.1902
	0.1456	0.1539	0.1666
QTR4	-0.1004	-0.1556	0.0275
	0.1240	0.1289	0.1407
TIME	-0.7186**	-1.1211***	-1.4166***
	0.2729	0.2322	0.2236
A(1)	-0.8945***	-0.9095***	-0.9038***
	0.0973	0.0685	0.0632
SSE	5.0026	6.7138	10.2186
MSE	0.1614	0.1918	0.2620
SBC	57.8631	70.1023	89.8364
Reg Rsq	0.9331	0.9692	0.9607
Durbin-Watson	1.8978	1.9505	2.0461
DFE	31	35	39
Root MSE	0.4017	0.4380	0.51190
AIC	46.3999	57.93864	77.03591
Total Rsq	0.9927	0.9970	0.9974

Standard errors of the parameters are reported below the estimates.
*, **, *** denote statistical significance at the 10%, 5%, and 1% level.

TABLE XXIV. Cheese model: parameter estimates and summary statistics.

Variable	Model 1989	1990	1991
Intercept	-1.4226	-17.4014***	6.3188
	7.6739	4.5349	8.0728
CPIDAIRY	1.0186***	1.1667***	0.9727***
	0.0698	0.0406	0.0699
QTR2	0.0714	0.2113	0.0084
	0.1111	0.1900	0.1756
QTR3	0.3092**	0.4967**	0.2644
	0.1340	0.2227	0.2073
QTR4	0.1141	0.3918**	0.1850
	0.1150	0.1965	0.1749
TIME	0.2782	0.0002	0.9074**
	0.1864	0.1149	0.3578
A(1)	-0.8152***	-0.4529***	-0.9350***
	0.1030	0.1550	0.0705
SSE	4.0163	10.4639	16.2681
MSE	0.1296	0.2990	0.4171
SBC	49.0000	87.2151	111.6020
Reg Rsq	0.9750	0.9926	0.9319
Durbin-Watson	1.7084	1.9540	1.9974
DFE	31	35	39
Root MSE	0.3588	0.5468	0.6459
AIC	37.5369	75.0514	98.8015
Total Rsq	0.9974	0.9972	0.9976

Standard errors of the parameters are reported below the estimates.
*, **, *** denote statistical significance at the 10%, 5%, and 1% level.

TABLE XXV. Cereals model: parameter estimates and summary statistics.

Variable	Model 1989	1990	1991
Intercept	-7.5733	-18.4075*	-24.2533***
	12.6590	9.2860	8.3109
CPICB	0.9770***	1.1427***	1.1248***
	0.2250	0.2176	0.2075
L1CB	0.1751	0.0987	0.1668
	0.2350	0.2275	0.2098
QTR2	0.0956	0.2083	0.2047
	0.2730	0.2658	0.2494
QTR3	-0.0036	0.2468	0.1812
	0.3120	0.3016	0.2816
QTR4	-0.3043	-0.1096	-0.1604
	0.3030	0.2966	0.2839
TIME	1.6470***	1.2754***	1.0677***
	0.4910	0.3846	0.3595
A(1)	-0.5319***	-0.5053***	-0.5411***
	0.1560	0.1503	0.1423
SSE	14.2946	17.4454	18.7311
MSE	0.4929	0.5286	0.5062
SBC	99.0331	111.3219	119.0626
Reg Rsq	0.9958	0.9970	0.9975
Durbin-Watson	1.8200	1.8625	1.8453
DFE	29	33	37
Root MSE	0.7021	0.7271	0.7115
AIC	86.1458	97.6133	104.6093
Total Rsq	0.9988	0.9991	0.9994

Standard errors of the parameters are reported below the estimates.
*, **, *** denote statistical significance at the 10%, 5%, and 1% level.

TABLE XXVI. Peanut butter model: parameter estimates and summary statistics.

Variable	Model		
	1989	1990	1991
QPEANUT	0.05075**	0.04321**	0.04490**
	0.01797	0.01654	0.01688
MKTCOST	0.00049	0.00115	0.00118
	0.00144	0.00130	0.00146
QTR2	0.00162	-0.00037	-0.00150
	0.011275	0.01063	0.01462
QTR3	-0.02419	-0.02008	-0.02721
	0.01568	0.01316	0.01727
QTR4	-0.02522*	-0.02133*	-0.04026**
	0.01391	0.01163	0.01577
A(1)	-0.90278***	-0.94141***	-0.95275***
	0.09931	0.07595	0.09457
SSE	0.0175	0.0188	0.0490
MSE	0.0011	0.0009	0.0020
SBC	-74.358	-92.5402	-84.5931
Reg Rsq	0.9838	0.9684	0.9173
Durbin-Watson	1.3476	1.3217	1.6722
DFE	16	20	24
Root MSE	0.0331	0.0307	0.0452
AIC	-80.9039	-100.0890	-93.0003
Total Rsq	0.9997	0.9997	0.9995

Standard errors of the parameters are reported below the estimates.

*, **, *** denote statistical significance at the 10%, 5%, and 1% level.

TABLE XXVII. Dry beans model: parameter estimates and summary statistics.

Variable	Model 1989	Model 1990	Model 1991 1/
DRYBEAN	0.008470***	0.010787***	NA
	0.001077	0.001165	NA
MKTCOST	0.000951***	0.000841***	NA
	0.000063	0.000072	NA
SSE	0.010616	0.022349	NA
MSE	0.000531	0.000931	NA
SBC	-99.387	-103.234	NA
Reg Rsq	0.9982	0.9972	NA
Durbin-Watson	0.7063	0.6450	NA
DFE	20	24	NA
Root MSE	0.023039	0.030516	NA
AIC	-101.569	-105.751	NA
Total Rsq	0.9982	0.9972	NA

Standard errors of the parameters are reported below the estimates.
*, **, *** denote statistical significance at the 10%, 5%, and 1% level.
1/ The model for 1991 is identical to 1990 since there were no additional
data available at the time of estimation.

APPENDIX B.   ANALYSIS OF PUBLIC COMMENTS

This appendix presents an analysis of the comments received by
FNS in response the interim report.   The interim report solicited
comments on the WIC index model, both on its construction and its
appropriateness for use in the funding allocation formula.
Specifically, FNS requested written comments regarding the
following:

1.   The most appropriate approach to infant formula
        prices and the treatment of rebates in the
        proposed WIC index model.

2.   The use of the PC 88 food quantity data and its
        suitability for use in the index.

3.   Should FNS adopt a WIC specific inflation index to
        replace the TFP index in the funding formula?

Sixteen individuals and organizations responded to FNS with
comments on the interim WIC index report:

Total Comments Received	16
WIC State Agencies	8
General Public	3
Federal Government Organizations	2
Public Interest Groups	3

Major Comment Areas Addressed:

1)   The most appropriate approach to infant formula prices and
the treatment of rebates in the proposed wic index model.

Commenters whom addressed this issue:	6
WIC State Agencies	5
Federal Government Organizations	1

Two (2) commenters recommended that the WIC index include an
adjustment to reflect the impact of infant formula rebates.   Four
(4) commenters were opposed to including an adjustment for
rebates in the WIC index model.

2)   The use of the PC 88 food quantity data and its suitability
for use in the index.

Commenters whom addressed this issue:	4
WIC State Agencies	3
Public Interest Groups	1

Three (3) commenters supported the use of the PC 88 food quantity
data to construct the model, however, one commenter supported the

use with reluctance. One (1) commenter neither supported nor opposed the use of the data but commented on the issue.

3)   Should FNS adopt a WIC specific inflation index to replace the TFP index in the funding formula?

Commenters whom addressed this issue:	12
WIC State Agencies	6
Federal Government Organization	1
Public Interest Groups	3
General Public	2

Eleven (11) commenters supported the concept of a WIC specific index, though several acknowledged that the proposed index was not yet suitable for the funding formula. One of these commenters suggested that FNS use the index model as an additional tool to monitor and report changes in WIC food costs. One (1) commenter opposed the use of a WIC specific index.